# THE AMERICAN REVIEW OF TUBERCULOSIS

OFFICIAL JOURNAL OF THE AMERICAN TRUDEAU SOCIETY

## ABSTRACTS OF TUBERCULOSIS


EDITOR

MAX PINNER, New York City

EDITORIAL BOARD

JOHN ALEXANDER, Ann Arbor, Mich.
J. BURNS AMBERSON, JR., New York City
E. R. BALDWIN, Saranac Lake, N. Y.
H. J. CORPER, Denver, Col.
F. S. DOLLEY, Los Angeles, Calif.
BRUCE H. DOUGLAS, Detroit, Mich.
L. U. GARDNER, Saranac Lake, N. Y.
ROSS GOLDEN, New York City
ESMOND R. LONG, Philadelphia, Pa.
LEWIS J. MOORMAN, Oklahoma City
D. W. RICHARDS, JR., New York City



VOLUME XLIV

JULY-DECEMBER, 1941

PUBLISHED MONTHLY

AT MOUNT ROYAL AND GUILFORD AVENUES, BALTIMORE, MD.

BY THE NATIONAL TUBERCULOSIS ASSOCIATION

THE

# AMERICAN REVIEW OF TUBERCULOSIS

# ABSTRACTS OF TUBERCULOSIS

VOLUME XLIV JULY, 1941 ABST. No. 1

CONTENTS

| Treatment | Pages |
|---|---|
| d. *Surgical (concluded)* | 1– 2 |
| e. *Suction Drainage of Cavities* | 3– 8 |
| Tuberculosis in Animals | 8–11 |
| Diseases Other than Tuberculosis | |
| a. *Nontuberculous Infections of Lungs* | 11–17 |
| b. *Tumors of Lungs* | 17–21 |
| c. *Pneumonoconiosis* | 22–27 |
| d. *Miscellaneous Diseases of Lungs* | 28–37 |
| e. *Extrapulmonary Conditions* | 38–40 |

**Interposition of Colon.**—Interposition of the colon between the liver and the right hemidiaphragm has been noted, and four instances, following operative paralysis of the right phrenic nerve, have been reported since 1934. Three additional cases are reported in which right hemidiaphragmatic paralysis cannot be disregarded. Symptomatology is usually not very serious and it is possible that part of the symptoms may be referable to displacement of other abdominal viscera. Symptoms are most often pain, frequently located in the chest, constipation or even recurrent obstipation. The possibility of gastrointestinal disturbance must be balanced with possible beneficial effects when considering phrenic operations for any particular case.—*Interposition of Colon following Right Phrenic Nerve Interruption, C. Muschenheim & J. B. Amberson, Jr., J. Thoracic Surg., August, 1939, 8: 638.*—(*L. F. B.*)

**Phrenic Crushing.**—The phrenic nerve is crushed for approximately one centimetre and then drawn upward into the neck for three and a half to four centimetres. The object is to tear any filaments entering the phrenic nerve below the clavicle. Complete paralysis has been obtained in all of 246 patients. Paralysis remains an average of ten to twelve months. Diaphragmatic motion then begins although the diaphragm is still elevated. The diaphragm returns to its normal position two to three months after motion returns.—*A New Technique for Phrenic Crush, L. W. Frank, J. Thoracic Surg., August, 1939, 8: 644.*—(*L. F. B.*)

**Phrenic Paralysis.**—One hundred and forty-one patients were operated on after seven months' observation. In 109 cases phrenic operation was the only collapse treatment; 22 per cent of the 109 patients were clinically healed and another 26.6 per cent improved. Forty per cent of the 109 became sputum-negative for tubercle bacilli. Twenty-seven per cent were fit for work after observation periods of one to seven years. Temporary phrenic operations seemed inferior. The author concludes that the phrenic operation has a decided though limited place in surgical treatment of pulmonary tuberculosis.—*Experiences and Results of Phrenic Nerve Operations Performed after Certain Observation Periods, B. O.*

*Nordgren, Acta tuberc. Scandinav., 1939, Fasc 3-4, 13: 286.—(H. R. G.)*

**Temporary Paralysis of Intercostal Nerves.**—The author describes the technique of injection of the first to sixth intercostal nerves, the object being to produce immobilization of that portion of the chest. It is suggested that use of this procedure has unlimited indications, especially in cases in which it is impossible to establish a pneumothorax and in fibrosclerotic cases. It is of use in cases of severe and obstinate haemoptysis. It should be considered in early cases in which it is undecided whether pneumothorax is necessary and in cases too sick to withstand other operative procedures.—*Treatment of Pulmonary Tuberculosis by Temporary Elimination of a Number of Intercostal Nerves, F. Torek, J. Thoracic Surg., August, 1939, 8: 607.—(L. F. B.)*

**Pneumonectomy.**—The author reviews 110 cases of pneumonectomy recorded in the literature as well as his own 22 cases. Excluding all cases prior to 1931, 62 of the 110 cases were done for malignant lesions and 48 for benign lesions. Mortality in this group was 65 per cent for the malignant cases and 24 per cent for the benign. In 15 of the author's 22 cases, pneumonectomy was performed for malignant disease with a mortality of 33.3 per cent, and 7 were for benign lesions without an operative death. Clinical studies in the 64 patients led to a diagnosis of primary malignancy of the lung with histological verification before death in 59. Thoracic exploration was indicated in over half of the patients harboring pulmonary cancer, since evidence of extension of the tumor beyond the lung could not be demonstrated by clinical examination. Over half the explored cases proved to be operable. Pneumonectomy was performed on 15 patients and lobectomy on 3. This places operability of primary cancer of the lung in this series at approximately 25 per cent.—*Pneumonectomy for Malignant and Suppurative Disease of the Lung, R. H. Overholt, J. Thoracic Surg., October, 1939, 9: 17.—(L. F. B.)*

**Oesophagus after Pneumonectomy.**—The position of the oesophagus was studied in 6 patients who had had pneumonectomy performed from six months to four years previously. No marked angulation or displacement of the oesophagus was observed in any patient, although moderate displacement toward the side of pneumonectomy was noted in some. No disturbance of function was noted and there were no significant oesophageal symptoms following pneumonectomy.—*Esophagus after Pneumonectomy, H. C. Maier & A. A. Ehler, J. Thoracic Surg., December, 1939, 9: 220.—(L. F. B.)*

**Bilateral Plombage.**—Two patients with cavernous tuberculosis of both apices were successfully treated with bilateral plombage.—*Über doppelseitige Plombierung bei Lungentuberkulose, O. Diebold, Ztschr. f. Tuberk., October, 1939, 83: 182.—(G. C. L.)*

**Treatment of Empyema.**—Most empyemata should be considered a purely medical problem. They should be completely drained as soon as diagnosed, whether acute or chronic, whether tuberculous or secondarily infected. Drainage should be continued until the pleural cavity is dry. The pneumothorax space should be maintained free and large after the empyema has been cured, if that treatment is still necessary for the pulmonary lesions. The theories once expressed by Sauerbruch and Dumarest that tuberculous empyema should not be interfered with, and that the pleural cavity should be drained only when respiratory difficulty presents itself, and then drained only enough to control intrathoracic pressures, cannot be accepted, because these theories are in direct contrast with experience gained through long practice. Purely tuberculous empyemata have been treated early with thoracocentesis, then pleural lavage with a warm 1:2000 watery solution of lysoform, followed by an injection of 10 to 20 cc. of 1 per cent solution of methylene blue. This procedure has been repeated every six to seven days until the exudate thinned down; then simple thoracocenteses were done followed by the injection of 10 cc. of the methylene blue solution. This method of treatment has usually converted the exudate from pus to clear serum in about two to two and one-half months. Isotonic solution has been preferred

for pleural lavage when bronchopleural fistula was suspected. Good results have been obtained in as high as 81 per cent of cases so treated. Recurrence of the empyema has been treated in the same manner. When after repeated attempts with this treatment there was no improvement in the empyema, no further consideration has been given to the maintenance of the pneumothorax space; the lung has been subjected to gradual reëxpansion by moderate aspiration of air following thoracocentesis and pleural lavage, especially when the empyema occurred near the termination of a pneumothorax treatment with healed pulmonary lesions. If reëxpansion could not be obtained, pneumothorax was converted into an oleothorax. Surgical collapse, however, was required at times. Empyemata with mixed infection were treated in the same manner. Closed permanent drainage was occasionally required, usually with good results in the chronic stage. Oleothorax and thoracoplasty followed the usual indications in these cases. Empyemata complicated by thoracic or bronchopleural fistulae have been treated with success by frequent thoracocenteses followed by aspiration of air in amounts sufficient to create as high a negative intrapleural pressure as the patient could tolerate. When this method was not successful, open drainage was done, preparatory to a total or partial thoracoplasty. In any event, when the condition of the contralateral lung precluded a thoracoplasty, it seemed preferable that the patient carry on with a draining sinus, which in many cases would finally close.—*Cura dell'empiema nel corso della tubercolosi polmonare, A. Castelli, Riv. di pat. e clin. d. tuberc., November 30, 1939, 13: 789.*—(*S. L.*)

**Suction Drainage of Cavities.**—This preliminary report covers the first 198 cases treated by Monaldi from August 7, 1938 to November 20, 1939. Seven cases are not included either because their cavities could not be entered, or their pleural space was free. These 198 cases were divided in three groups for statistical purposes. The first group of 64 cases (32 per cent of the total) represents the poor results. Thirty-eight of these patients were treated in order to perfect the technique and to study the anatomical changes occurring in the cavity, although all of these patients appeared to be unfit for this type of treatment, due to their serious condition and complications. In 18 more patients treatment had to be abandoned because either the sound came out of the cavity and could not be reinserted, or there was no sign that the cavity would close, or because the draining bronchus remained patent. In 3 more patients serious incidents occurred—one contralateral spontaneous pneumothorax and 2 intracavitary haemorrhages—, and treatment was abandoned; 5 others of this group of patients died—3 because of intercurrent conditions elsewhere in the body, and 2 because of embolism directly referable to the operation. A second group of 55 cases (28 per cent of the total) represents fair results to date: these patients, however, are still under treatment and observation. Twenty-four patients have had this treatment started recently and their course is normal. In 14 patients treatment is advanced, cavities are much reduced in size, endocavitary secretions are negative for tubercle bacilli and general condition is satisfactory. In 11 patients the cavities are closed, but the draining bronchus is still patent; and in 6 patients treatment has been abandoned although there are very small residual cavities, but it is hoped, as it has occurred in some cases, that there may be a spontaneous and definite closure of these cavities. A third group includes 79 patients (40 per cent of the total) with very good final closure of the cavities, as shown by repeated stratigraphic X-ray studies. Thirty-eight of these cases are still under constant observation, with the rubber sound *in situ*, because, although their cavities appear closed and no secretions are aspirated, their draining bronchus is possibly still somewhat patent; the remaining 41 patients have had their treatment completed for a period of from one to fourteen months with definite signs of complete healing. To obtain these results it was necessary to employ an exact technique and to carry out rigorous management of the cases. Two deaths should be attributed partly to limited technical experience of the method, when at first employed, and partly to the total of eventualities that inevitably accompany any intervention. Re-

view of roentgenograms and of stratigrams gives evidence, beyond any argument, that closure of cavities by this method is possible, however old the cavities may be. This preliminary work has also demonstrated that usually a remarkably good general improvement occurs, together with normal temperature, better nutrition and disappearance of toxaemia. And in many patients there was seen concurrent and unhoped for improvement of other pulmonary and extrapulmonary lesions, especially of the larynx. The only question at the present time is whether the benefit derived by this method of treatment will be permanent or only temporary. Even should it be temporary or partial, it would be of great value because, following local and general improvement, many patients could be given the benefit of other treatments, especially surgical, that would not have been considered without such improvement. It is Monaldi's opinion that this treatment should be adopted in cases with pleural symphysis, with large and isolated cavities, that are surrounded by sufficient parenchyma. —*Attività scientifica dell'Istituto Carlo Forlanini nell'ultimo bienno 1938–1939, E. Morelli, Ann. d. Ist. Carlo Forlanini, November–December, 1939, 3: 10.*—(*S. L.*)

**Suction Drainage of Cavities.**—Eloesser's use of external drainage for the blocked pulmonary cavity has been given wider application by Monaldi. The method is based upon the belief that production by aspiration of a negative pressure within a cavity will facilitate closure of the cavity. Removal of the secretions also appears to diminish toxaemia. Aspiration is performed by a catheter introduced by means of a trocar under fluoroscopic guidance. For the first few days a negative pressure of 10 to 15 cm. of water is maintained; thereafter the maximum negative pressure should be 30 cm. A patent bronchus would prevent attainment of a negative pressure, but in practice the bronchus closes as soon as suction is applied. This is presumably the result of the reduction in size of the cavity, and accumulation of secretions within the lumen of the bronchus. The results depend upon the condition of the surrounding tissue. When the neighboring lung is relatively free of disease and is elastic, diminution in size of the cavity of as much as 80 per cent has been observed in a week. Aspiration should be maintained from two to six months or until there is roentgenological disappearance of the cavity and permanent closure of the bronchus can be demonstrated. When the catheter is removed under these conditions, the fistula heals promptly. The authors believe this method of treatment is a useful adjunct to rest treatment of patients with chronic cavities, unilateral or bilateral. The operation cannot be performed if a free pleural space is present. The operative risk and the danger of complications appear to be slight.—*Premier essais d'aspiration des cavernes par le procédé de Monaldi, Technique de la méthode, R. Burnaud & W. Francken, Rev. de la tuberc., 1939–1940, 5: 1134.*—(*H. L. I.*)

**Pericavitary Atelectasis.**—Pericavitary atelectases do not occur in every case of pulmonary tuberculosis nor are they all formed in the same manner or to the same extent. In spite of this they often serve admirably to collapse a cavity as in the healing of cavities in Monaldi's suction drainage. The presence of a large area of atelectasis about a cavity may cause a closure of it after it has been drained too rapidly and may occur before the wall is entirely clean. Then incomplete healing occurs and reëxpansion of the cavity takes place after withdrawal of the tube. There are other factors which share in the healing of cavities: poorly aerated areas in the lung reëxpand, normal areas become distended, "physiological atelectases" (Seemann) disappear, and finally, as is well known, nearby organs may become displaced. Pericavitary atelectases represent only one of the factors which aid in the healing of cavities. Well illustrated cases of successful drainage of cavities are included.—*Pericavernöse Atelectasen und ihre Bedeutung für die Kavernen-Saugdrainage (Monaldi), J. Argemi & R. W. Müller, Beitr. z. Klin. d. Tuberk., 1939, 93: 615.*—(*R. K.*)

**Suction Drainage of Cavities.**—By producing a permanent negative pressure in a cavity by the method of Monaldi the surrounding atelectatic tissue expands and the size of

the cavity is diminished. Even cavities with rigid walls shrink under these conditions. In the cadaver extensive movement of the cavity wall was observed with a thoracoscope even when the pressure changes were small. The wall is protruded into the cavity, especially around the draining bronchus. This therapy is only possible if the pleura near the cavity is adherent. It is favorable in isolated cavities. The dangers are haemorrhage, air embolism and reactivation of neighboring foci. The use of a special trocar devised by Bottari is recommended. The author reports on 3 patients so treated with good results.—*Die Behandlung der tuberkulösen Kaverne mit der Kavernensaugdränage. Grundlagen des Verfahrens, Anwendungsgebiet, Technik, Erfolge, A. Schuberth, Ztschr. f. Tuberk., February, 1940, 84: 185.*—(*G. C. L.*)

**Suction Drainage of Cavities.**—The Monaldi method is not new. Eloesser conceived this method in 1936, called it "suction drainage," and treated patients with such "disappointing" results that he abandoned its use. In Monaldi's hands it has apparently acquired a new prestige and the results have been satisfactory according to the late report on the first 100 cases. While, however, in this report mention is made of autopsy findings, no statistics are given as to the number of healed, improved or dead. The genesis and healing of pulmonary cavities appears to be a simple matter, but it is actually one of the most complex problems of modern phthisiology. Discovery of X-ray and the subsequent extensive radiological researches in the whole field of pulmonary tuberculosis have revealed the great frequency of cavitary lesions, even when the keenest ear would not have perceived them. Roentgen films have also shown these cavities at every stage of the disease and have demonstrated that some cavities may occasionally recede spontaneously, while at other times no method of collapse will close them. Monaldi says that with intracavitary aspiration closure occurs because of the retractile power of the cavity walls, in contrast with centrifugal parietal forces, and because of a centripetal power of the pulmonary tissue, drawn by the resistance of the pericavitary atelectatic tissue to reëxpand. This phenomenon is only possible when the cavity is surrounded by elastic tissue, but certainly not when such tissue is infiltrated or sclerotic. It does not seem possible that aspiration can rebuild the retractile fibers that are thoroughly destroyed by the process of ulceration and caseation, and that intracavitary high negative pressures will not hurt the structure and function of the pericavitary infiltrated tissue. The real cause of the elision of cavities by this method may be found in the stenosis and obliteration of the draining bronchus; but such an event may become the source of great danger when the cavity is still active, because of the trauma exerted by the high negative intracavitary pressure. The unsuccessful treatment of three of Bocchetti's patients, chosen and operated upon by Monaldi, seems to prove all these contentions. Cleansing of a cavity by means of alternated suction drainage is useful for the purpose of closure of cavities to a certain point, when an added physical, chemical or pharmacodynamic stimulus to the neurotrophic elements of the cavity walls will perhaps create a favorable condition for their anatomical synthesis. These stimuli should shorten the necrotic phase and intensify regeneration. For the present, intracavitary aspiration is still in the experimental stage. If time proves it successful, it will be a great contribution to the science of phthisiology, tending to eliminate a difficulty in the healing of pulmonary cavities.—*L'aspirazione endocavitaria nella cura delle caverne tubercolari polmonari, F. Bocchetti, Lotta contro la tuberc., September, 1939, 10: 799.*—(*S. L.*)

**Suction Drainage of Cavities.**—From a review of the first 100 treated cases it appears that best results are obtained in cavities with ample surrounding parenchyma, which is as a rule atelectatic. By this method of treatment at first a gradual reëxpansion of the atelectatic tissue has been observed, with a subsequent decrease of the size of the cavity; in a latter stage the reëxpanded parenchyma would fill the space created by the retraction of the cavity. In cases with abundant pericavitary parenchyma relatively high negative intracavitary pressures can be safely used. In cases

with sparse parenchyma around the cavity, aspiration should not be forced, and intracavitary pressures should be at a lower negative level. Aspiration may not always succeed in closing these latter cavities in their entirety, and should be supplemented by a phrenic operation or by an elastic anterolateral thoracoplasty, both of which tend to reduce intrathoracic space. Conversely, intracavitary aspiration has proved especially valuable in closing cavities still open following a phrenic or an anterolateral thoracoplasty. Negative intracavitary pressure can always be established and maintained for the length of the treatment without damage to structure and function of any surrounding tissues. Usually it was not necessary to employ an aspiration of high degree to overcome mechanical factors that may have opposed retraction of the cavity. An intracavitary pressure of between −10 and −30 has been sufficient in all cases, with only temporary pressures up to −50 under exceptional circumstances. The draining bronchus, if patent, is apt to be of very small calibre; but this can be overcome by employing for the aspiration a small sound similar in diameter to No. 12, or even No. 9 *Nélaton*. Data collected during treatment of these 100 cases, some of them going later to autopsy, showed that the draining bronchus, when patent, tended to become narrower, occasionally even obliterating. Of course, quicker and better results were obtained when the draining bronchus was stenosed at the start of the treatment. It has also been demonstrated that aspiration need not be continuous nor always at the same high negative level, because once the parenchyma had reëxpanded it showed no tendency to retract immediately. Only time, together with histological studies of subjects so treated coming to autopsy, will tell whether cavity walls, after being brought together by intracavitary aspiration, may finally adhere through formation of connective tissue. Only then it will be possible to talk of true healing. For the present we can say that aspiration cleanses the cavity walls of purulent and caseous materials and causes a decrease of exudation in the pericavitary tissue. Blood circulation in the system of small vessels in the pericavitary parenchyma undergoes notable variations, too, because of intracavitary aspiration; this is mostly due to reëxpansion of the atelectatic areas that were pressing on these vessels. After the walls of the cavity have been cleansed by aspiration, physicochemical conditions of liquids deriving from these walls return to a physiological status. This was demonstrated by the study of the pH of liquid materials obtained by intracavitary aspiration. While at first pH was constantly below 7, as long as infected material was withdrawn, subsequently it rose to a normal of 7.4 when serous or serosanguineous liquid was finally obtained. With cleansing of the cavity walls tubercle bacilli were also eliminated from within the cavity. Then, formation of granulation tissue preceded the final cicatricial process. These data seem to prove unequivocally, from the mechanical viewpoint, that intracavitary aspiration can cause closure of pulmonary cavities in the greatest number of cases, with concurrence of biological conditions that allow formation of connective tissue in a particularly favorable environment. Many patients, ill for years and treated without success in various ways, have regained full well-being by this method of treatment in two to four months, without any relapse to date.—*Sull'aspirazione endocavitaria nel trattamento delle caverne tubercolari del polmone, V. Monaldi, Lotta contro la tuberc., August, 1939, **10:** 703.*—(*S. L.*)

**Suction Drainage of Cavities.**—Monaldi's method has been constructed on a theoretical basis, which, though ingenious, lacks precisely that indispensable solidity necessary to support the weight of criticism. When Monaldi brought theoretical principles in the field of practical application, he had to adapt his deeds to his premises. In other words he has used deductive instead of the inductive methods usually followed in a scientific research. Monaldi's theory is that the atelectatic pericavity tissue changes first into normal and then into emphysematous tissue, while the cavity gradually decreases to a mere point, because the cavity space has been replaced by the emphysematous tissue under the influence of the intracavitary aspiration. This hypothesis is attractive, but nothing similar to this has ever been seen on the autopsy table.

Atelectatic parenchyma existing around a cavity does not represent a mass of shut alveoli that can be opened at will. This atelectatic parenchyma, when partly infiltrated or degenerated, cannot become normal, much less emphysematous, so as to replace the preëxisting cavity. This phenomenon is more difficult to understand when dealing with cavities having thick sclerotic walls and parietal adhesions, that constitute a serious obstacle to any reduction of the cavity space. Another weakness of Monaldi's theory refers to the question of the draining bronchus. If there exists complete stenosis, this would explain the decrease in size and perhaps complete closure of the cavity, even without the help of intracavitary aspiration, as it has been reported by several observers. But if the draining bronchus is pervious, even of the diameter of a *Nélaton* no. 12, then by intracavitary aspiration we would only aspirate air from the bronchus, wash the cavity with this air and finally aspirate this air through the rubber sound. Monaldi says that a patent draining bronchus, in response to his aspiration treatment, tends to become smaller and even obliterates. This has not been clinically demonstrated by the injection of lipiodol. Certainly the disappearance of a cavity on clinical and radiological examinations is not a positive sign of its healing. Intracavitary aspiration will remain in the archives of medical history as one of the many praiseworthy, but useless attempts devised, after Forlanini's great discovery, to cure pulmonary tuberculosis.—*L'aspirazione endocavitaria per la cura delle caverne polmonari, G. Costantini, Riv. di pat. e clin. d. tuberc., November 30, 1939, 13: 817.*—(*S. L.*)

**Suction Drainage of Cavities.**—The apparatus for the intracavitary drainage described in this paper is somewhat different from Monaldi's apparatus. Its advantages are: the patient is able to walk around with it, the cavities are generally healed within five to eight weeks and it is possible to drain several cavities simultaneously. There are no absolute rigid cavities, nor are the cavities as large as they seem; they are distended by air tension. Although the operation is not strenuous for the patient, it has a few technical difficulties, and X-ray control is necessary. No fistula remains after the removal of the drainage tube. In 53 operations there was one death due to a pulmonary haemorrhage. The contraindication is a free pleural space. Intracavitary drainage can also be used in conjunction with thoracoplasty. Spread which is feared in collapse therapy is prevented by the drainage.—*Saugdrainageverfahren zur Heilung tuberkulöser Kavernen in der Lunge, H. Weber, Ztschr. f. Tuberk., December, 1939, 84: 19.*—(*G. C. L.*)

**Suction Drainage of Cavities.**—A detailed description of Monaldi's technique of intracavitary drainage is given. The position of the cavity should be exactly determined with the aid of tomograms. Theoretically the dangers are: air embolism, haemorrhage, pyopneumothorax (if the pleural space is not obliterated) and permanent fistula. This treatment does not decrease the available respiratory surface. Intracavitary drainage is indicated in the treatment of those cavities in which collapse therapy is not applicable. The contraindications are: poor general resistance to tuberculosis and a pleural space which is not obliterated. Seven cases are described in which intracavitary drainage was attempted, in one of which it could not be performed because the pleural space was not obliterated. In none of the 6 cases did the drainage or the sputum become bacillus free. In 4 cases the cavities showed a marked reduction in size. Other forms of collapse therapy can be used at the same time. The good effect of this treatment is explained according to Monaldi by the negative pressure in the cavity causing the surrounding atelectatic tissue to reëxpand. At the same time, the air running through the cavity cleans the wall of the cavity and new granulations are formed.—*Über Kavernenheilung durch Saugdrainage nach Monaldi, H. Grass, Ztschr. f. Tuberk., December, 1939, 84: 1.*—(*G. C. L.*)

**Suction Drainage of Cavities.**—Studies of intracavitary pressure have been made in a group of 50 patients having Monaldi's intracavitary aspiration. Pressure records were made by a special instrument which also re-

corded synchronous thoracic expansions. During the inspiratory phase, dilatation of the thoracic walls affects the whole lung—therefore also the cavity walls—thus favoring further increase in the size of the cavity. This action is somewhat regulated by the quality and quantity of parenchyma surrounding the cavity. When the draining bronchus is completely or even partially stenosed during the expiratory phase, there occurs in the cavity a progressive and continuous hypertensive state that tends to balloon out and increase the size of the cavity. This mechanism may explain the pericavitary atelectasis, due to the compression of the tissue surrounding the cavity, which assumes so much importance in the mode of action of intracavitary aspiration by the Monaldi method. Results of these studies apparently confirm the mechanical and biological theories expounded by Morelli and Monaldi on the mechanism of formation of pulmonary cavities.—*Sulle caratteristiche fisiopatologiche delle caverne tubercolari del polmone: il regime tensivo endocavitario, G. Babolini, Ann. d. Ist. Carlo Forlanini, March–April, 1940, 4: 243.*—(*S. L.*)

**Bacteria in Tuberculous Cavities.**—Intracavitary secretions have been collected aseptically from 33 patients while they were treated by the Monaldi intracavitary aspiration. The material was either aspirated with a syringe immediately after introduction of the trocar and sound, or, when the amount would have been too scanty at the time of the operation, the first twenty-four hour collection of secretions was taken. Bacteriological examinations were made with Gram's, Ziehl-Neelsen's methods and with methylene blue stain; cultures were inoculated on beef broth, glucose bouillon and on agar. In 29 of these patients only tubercle bacilli were found in the secretions obtained from the cavities, even when symptoms usually attributed to mixed infection were present, such as toxaemia with dehydration, intermittent fever and progressive pulmonary lesions. In further aspirations of the contents of the cavities of 26 of these patients it was noted that sooner or later—five to seventy-one days—the material obtained by aspiration was contaminated by common pyogenic cocci; never by anaerobes or fungi. It is thought that contamination may occur in one of three ways: either through the rubber sound, through the slight space existing between thoracic wall and rubber sound, or through the bronchial tree; the latter hypothesis may be true, by direct aspiration, in cavities with a patent bronchial opening. This associated bacteric flora, however, that appears sooner or later and in different amounts in cavities undergoing aspiration treatment, does not influence the general condition of the patient, and alters neither his temperature curve, nor the anatomoclinical pulmonary picture. The beneficial local changes inherent in intracavitary aspiration proceed whether or not secondary organisms appear within the treated cavity. This research seems to confirm the observation of Coryllos and Ornstein that a tuberculous cavity does not contain bacteria other than the tubercle bacillus; that the cavity becomes contaminated during the course of intracavitary aspiration; and that this subsequent contamination has no pathogenetic value.—*Indagini batteriologiche sul contenuto delle caverne tubercolari del polmone trattate con l'aspirazione endocavitaria, G. Zorzoli & G. Fojanini, Ann. d. Ist. Carlo Forlanini, November–December, 1939, 3: 858.*—(*S. L.*)

**Veterinary Committee on Tuberculosis.**—All counties in all of the states, except 8 counties in California, are now in the modified accredited area and have been so since July 1, 1938. All municipalities in Puerto Rico and the Virgin Islands are also in this classification. There were about 60,000 reactors to tuberculin among the 1,100,000 cattle tested and the average extent of infection for the entire country, outside of California, was 0.34 per cent. The importance of retesting is stressed. A higher percentage of "no-visible-lesion" cases has been reported and further study of these cases is advised. Avian tuberculosis continues to be an important problem. Efforts to eradicate and control this type of disease have been very satisfactory in some localities but not in others. The disposition of hens after the first laying season continues to be one of the important features of the eradication program. It will be more helpful

to have more poultry dressed under the veterinary supervision of the State or the Federal Government. It would seem that some system could be developed whereby there might be more supervision of the handling of poultry at receiving points so that visibly diseased fowls could be rejected and destroyed at these points. —*Tuberculosis, A. E. Wight, J. Am. Vet. M. A., November, 1939, 95: 611.*—(*L. F. B.*)

**Early Diagnosis of Bone Tuberculosis.**—Pulmonary and bone tuberculosis should not be considered as separate entities but as different manifestations of the same disease. In cases where diagnosis of a bone condition is in doubt, a thorough examination of the chest should be made. Of the bones, the spine, hip and knee are most frequently involved. Pain in the spine should always be treated seriously in children because it is seldom the site of injury, and other conditions of childhood seldom cause pain. There may be a dislike of jolting or jarring the spine, as well as stiffness and tenderness. Among adults many other conditions may cause spine pain so that diagnosis is more difficult and repeated examinations by X-ray may be necessary. With hip involvement there is pain, a limp, muscle spasm, muscle wasting, and absence of real shortening. Shortening depends upon the presence of bone destruction. The same symptoms appear with disease of the knee, as well as swelling and position at which the knee is held. The slow development of tuberculosis, difficulty in interpreting X-rays and correct assessment of symptoms are difficulties in early diagnosis. Injury, infective synovitis, osteochondritis, rheumatism and "growing pains" must be distinguished from early tuberculosis. X-rays form an essential part of the examination of any bone or joint disease. Other laboratory aids in diagnosis are biopsy of the joint, removal of a regional lymph node and the Mantoux test.—*The Problem of Early Diagnosis in Surgical Tuberculosis, A. T. Fripp, J. Roy. Inst. Pub. Health & Hyg., May, 1940, 3: 127.*—(*L. F. B.*)

**Avian Tuberculin.**—In preliminary experiments, guinea pigs infected with human tubercle bacilli were killed by intraperitoneal injection of human as well as of avian tuberculin; animals infected with avian tubercle bacilli remained alive after injection. Animals sick with infection from human tubercle bacilli reacted positively not only to human but to avian tuberculin. Healthy animals infected with avian tubercle bacilli showed no uniform reaction to the tuberculin test. Allergy to tubercle bacilli of the human type may extend to the avian type. The presence of an infection with avian tubercle bacilli cannot be concluded on the basis of a positive reaction to avian tuberculin. Eighty-three of 100 children reacting positively to human tuberculin reacted positively to avian tuberculin. Of 18 children negative to human tuberculin 2 were found with positive reactions to avian tuberculin, without there being the slightest evidence of avian tuberculosis in them. From the high sensitivity to the heterologous antigen the conclution is drawn that there is a close biological relationship between human and avian tuberculin and human and avian tubercle bacilli.—*Untersuchungen mit Geflügeltuberkulin, K. Dietl & V. Koszler, Beitr. z. Klin. d. Tuberk., 1939, 92: 697.*—(*R. K.*)

**Sensitization of Cattle by Avian Tubercle Bacillus.**—Virulent avian tubercle bacilli inoculated subcutaneously have been found to sensitize cattle to mammalian tuberculin. An avirulent strain of avian tubercle bacillus was isolated from a composite of the lymph nodes of a cow from a herd with no history of bovine tuberculosis. A large dose of the culture produced acute tuberculosis in rabbits soon after its isolation but chickens inoculated with it a year later did not acquire tuberculosis. Several years after isolation the culture did not produce progressive tuberculosis in rabbits. Cultural characteristics of this strain were similar to those of virulent bacilli. Serologically, five years after isolation, the tuberculin protein from this culture cannot be distinguished from the tuberculin proteins of virulent avian tubercle bacilli. When 10 mg. of the cultures of the avirulent organism was inoculated into two calves, both became sensitive to both mammalian and avian tuberculins. It was not possible to recover organisms from the lymph nodes adjacent to the point of inocu-

lation. It should be emphasized that even though bovine tuberculosis is being rapidly eradicated, cattle will continue to react to tuberculin until avian tuberculin is also eradicated. The ratio of these nonspecific reactors may be expected to continue to increase until a more concerted effort is made to eradicate avian tuberculosis from chickens and hogs.—*The Sensitization of Cattle to Mammalian Tuberculin by an Avirulent Strain of Avian Tubercle Bacillus, Janet R. McCarter, E. G. Hastins & B. A. Bech, J. Am. Vet. M. A., January, 1940, 96: 52.*—(*L. F. B.*)

**Acid-fast Bacterium in Swine.**—Acid-fast microörganisms other than tubercle bacilli have been isolated frequently from many sources. Those recovered from animal tissues are of particular interest because of the tinctorial similarity to the tubercle bacillus and because of the possibility that they may sensitize animals to tuberculin. The microörganism reported in this study is a rapidly growing acid-fast bacillus which was frequently encountered in swine that were being examined for the presence of tubercle bacilli. One tonsil was removed from each of 47 swine carcasses which at necropsy revealed slight localized lesions of tuberculosis. A similar number of tonsils were obtained from swine carcasses without gross evidence of tuberculosis. Thirteen or 27.6 per cent of the 47 tonsils from swine with slight localized lesions of tuberculosis yielded a rapidly growing acid-fast bacterium. Cultures of 11 or 23.4 per cent of the 47 tonsils of swine without lesions of tuberculosis gave the same microörganism. All the cultures isolated were found to be alike in appearance and growth requirements. The microörganism apparently produces no recognizable disease in chickens, mice or calves. Subcutaneous injections of large doses in guinea pigs and rabbits will produce a localized region of caseation necrosis with no tendency toward extension of the lesion. The microörganism will sensitize guinea pigs to avian tuberculin and to homologous culture filtrates. No sensitivity to mammalian tuberculin is produced. Cross agglutination reactions indicate that the swine tonsil microörganism has antigenic components in common with the avian tubercle bacillus. The authors have been unable to find in the literature a description of a similar microörganism.—*Studies of an Acid-Fast Bacterium Frequently Present in Tonsillar Tissue of Swine, A. G. Karlson & W. H. Feldman, J. Bact., April, 1940, 39: 461.*—(*F. G. P.*)

**Tubercle Bacilli in Swine Tonsils.**—By bacteriological means one tonsil from each of 94 swine carcasses was examined for tubercle bacilli. Tuberculous lesions were present in the contiguous lymph nodes of 42 of the carcasses while in the remainder no lesions were found. A portion of each tonsil was removed for histological examination, duplicate sections being stained with haematoxylin and eosin and with a carbolfuchsin combination. The remaining portion of each tonsil was emulsified, treated with 5 per cent oxalic acid and, after centrifugation, planted on glycerinated and nonglycerinated egg-yolk-agar media. Animal pathogenicity tests included the injection of 2 guinea pigs and 2 rabbits. Microscopically, morbid changes were present in practically all tonsils, most of minimal severity and of nonspecific character. In only 4 of the 22 tonsils from which tubercle bacilli were demonstrated were there lesions that possibly resembled tuberculosis. Bacteriologically, tubercle bacilli were obtained from 22 tonsils, or approximately 23.4 per cent of the 94 studied. Tubercle bacilli were obtained from 14 of the 47 carcasses showing gross lesions of tuberculosis and from 8 of the 47 with no gross signs of tuberculosis. Avian tubercle bacilli were found in all of the 22 cases. Naturally acquired tuberculosis in swine is practically always by way of the alimentary tract and it is difficult to understand why the tonsils are not more frequently and more seriously affected. No lesions typical or characteristic of tuberculosis were found in any of the tonsils microscopically although in 4 of the 22 there were lesions that were suggestive. Unless the practice of animal pathogenicity tests is followed, a diagnosis of tuberculosis of the tonsils based on gross or microscopical appearance is only presumptive.—*Avian Tubercle Bacilli in Tonsils of Swine, W. H. Feldman & A. G. Karlson,*

*J. Am. Vet. M. A., February, 1940, 96: 146.*—(*L. F. B.*)

**Tuberculin Reaction and Bang's Disease.**—To find whether infection with *Brucella abortus* sensitizes any considerable number of cattle to tuberculin and is partially responsible for the large number of "no-visible-lesion" tuberculin-reacting cattle in Wisconsin, sera from tuberculin-reacting cattle were tested for agglutinins of *Br. abortus*. The results were correlated with autopsy findings. Such tests were conducted on 805 animals. Thirteen per cent of the cattle showing tuberculous lesions also showed agglutinins for *Br. abortus*, 3.1 per cent of cattle with skin lesions only had such agglutinins and 5.6 per cent of cattle having no visible lesion but were tuberculin positive showed agglutinins for *Br. abortus*. Since the percentage of animals with a positive agglutination test was higher in the lesion than in the "no-visible-lesion" group, the probabilities were that few, if any, of the tuberculin reactions in the latter group were due to nonspecific sensitization by *Br. abortus*. Intracutaneous tuberculin tests were made on three herds of cattle experimentally infected with *Br. abortus*. The conclusion, from the data obtained, would again be that cattle are not sensitized to tuberculin by abortion bacilli. The indications are that no significant number, if any, of the "no-visible-lesion" cattle in Wisconsin have reacted to tuberculin because of infection with *Br. abortus.*—*Tuberculin Reactions in Cattle Affected with Bang's Disease, E. G. Hastings, Janet R. McCarter, B. A. Beach, W. Wisnicky & J. S. Healy, J. Am. Vet. M. A., February, 1940, 96: 186.*—(*L. F. B.*)

**Transitory Lung Infiltrations.**—The report covers 20 patients in whom, roentgenologically, infiltrations in the lungs and symptoms suspicious of tuberculosis had been found. The infiltrations disappeared within a few weeks. It is difficult to decide whether an infiltration is of tuberculous or nonspecific origin, but generally the differential diagnosis can be made by a thorough examination. The X-ray examination is of greatest importance. The infiltrations are not tuberculous if they are situated more centrally and appear irregularly spotted and striped with clearer areas between. In 12 of these 20 patients the infiltrations were nonspecific, in 6 tuberculous and in 2 a diagnosis could not definitely be made. If we remember that infiltrations in the lungs can also be nonspecific we will find them more often.—*Beitrag zur Kenntnis flüchtiger Verschattungen der Lungen, G. Martens, Ztschr. f. Tuberk., December, 1939, 84: 26.*—(*G. C. L.*)

**Lung Abscess.**—Seventy-seven cases of nonmalignant lung abscess are analyzed. Two-thirds of these were putrid. The routine treatment was primarily medical, surgery being employed when medical treatment failed or complications such as empyema occurred. The total mortality was 28.5 per cent. Late results are given in 43 cases.—*A Review of Seventy-seven Consecutive Cases of Pulmonary Abscess, A. G. Bryce, Brit. J. Tuberc., October, 1939, 33: 197.*—(*A. P.*)

**Lung Abscess.**—The absence of symptoms and the disappearance of the roentgenographic findings of a lung abscess and its surrounding pneumonitis are usually accepted as evidence that an abscess has healed. However, the number of recurrences reported suggest that these criteria are insufficient. For many years bronchography has been used to determine the effectiveness of thoracoplasties in the closure of cavities, to demonstrate both tuberculous and nontuberculous bronchiectasis, and to study the various phases of lung abscess, but there is no account in the literature of such routine studies in apparently healed abscesses. Amberson *et al.* quite regularly demonstrated residual cavities or bronchiectasis in cases of apparently healed abscess with bronchography, but have not reported their work. Therefore, a group of 6 cases of lung abscess are reported and the results of bronchographic study presented. In all these cases the abscesses were considered healed according to the usual criteria, but bronchograms showed either bronchiectatic defects or remnants of cavities. The latter probably represents an arrested stage of the fibrotic contraction of the cavity and should be regarded as less than theoretically complete healing. Such *residua* are not

as common as bronchiectasis. The bronchiectatic remnant is explained by Pinner's concept of the unity of bronchopulmonary suppuration. He demonstrated that all phases of bronchopulmonary suppuration are present in some degree in bronchopulmonary suppurative lesions, the predominance of one phase determining the clinical diagnosis. The permanence of bronchiectasis is well known and the tendency to reactivation has been reported by many. Reports of cure are probably based largely on the disappearance of symptoms rather than the disappearance of bronchiectasis. It seems logical, therefore, to regard bronchiectatic residues from lung abscesses as potentially dangerous. It is believed that bronchographic study should be employed routinely to determine the state of bronchi and lung after the symptoms and roentgenographic shadows of acute suppurative pulmonary disease have disappeared.—*Bronchographic Study of Apparently Healed Lung Abscesses, R. M. Franklin, Am. J. M. Sc., July, 1939, **198:** 95.*—(*G. F. M.*)

**Lung Abscess.**—Viswanathan cites Maxwell's classification, primarily an anatomical one. Of 32 cases in his series 26 were uniocular, 24 peripheral and 30 communicating with a bronchus. In 10 cases an upper lobe was involved and one was definitely apical. The commonest age group was thirty to thirty-nine. There were 26 males and 6 females. It is thought that many cases result from an abortive pneumonia in pneumonitis and Scadding's disseminated focal pneumonia. In 20, the onset was sudden, in 8 insidious. Fever was the commonest initial symptom, usually preceding cough by about two weeks. In 26 there was purulent sputum and in 22 it was foul. Haemoptysis occurred in 16 but was the initial symptom only once. Four patients showed clubbing of fingers. A dull continuous chest pain was common, differing from ordinary pleurisy. Physical signs were variable and occasionally absent. Feeble breath sounds and diminished vocal resonance were as common as the typical cavity signs. In 6 cases the roentgenographic evidence was completely decisive, in the others confirmatory. Rapidly spreading changes suggest pulmonary gangrene. Surgical drainage was used in 10 with 5 deaths. Pneumothorax was given in 4 with one death. Medical treatment was tried in 18 of whom 5 completely recovered, 3 left prematurely, 3 left against advice and 7 died. It is generally agreed that medical treatment is the choice in the early stages. Rest and postural drainage are the first measures. The arsenical and sulphonamide group of drugs and intravenous guaiacol have been used. In suitable cases bronchoscopic drainage and aspiration are effective. If there is not marked improvement after six weeks' medical treatment, surgical drainage is indicated. Artificial pneumothorax is successful in a small percentage, not near the periphery and with free bronchial communication. A series of roentgenographic reproductions accompanies the paper.—*Abscess of the Lung, R. Viswanathan, Tubercle, March, 1939, **20:** 268.*—(*A. P.*)

**Lung Abscess.**—An analysis is presented of 88 cases of lung abscess; of these 57 per cent are well or improved and 41 per cent dead. Abscesses developing as complications of lung tumors or those originating from a long standing bronchiectasis were excluded; also all cases complicated by tuberculosis or resulting from a generalized septicaemia. However, no attempt was made to separate the cases of pulmonary gangrene from those of abscess, for it seems that no clear-cut dividing line can be drawn between them in the majority of instances. There were 58 males and 30 females in the group and all but 5 were adults. Although lung abscesses usually occur in the lower lobes, in the present series the upper lobes were found more frequently involved than the lower. The importance of respiratory infections, such as pneumonia, in the aetiology of this disease was noted in the group; 40 per cent gave a history of pneumonia. Other conditions found to be factors in the production of abscess were operations on the upper respiratory tract, especially tonsillectomy and operations in other parts of the body, mainly abdominal. In quite a large group the precipitating factors were unknown. In cases following tonsillectomy and other operations on the upper respiratory tract, the evidence favors aspiration of infected material as the most likely

cause. Probably the most important single step in the pathogenesis of the majority of lung abscesses, however, is atelectasis. This may follow the plugging of a bronchus or bronchi; it may occur in the course of pneumonia if bronchi are plugged by tenacious exudate; it may follow the aspiration of vomitus or a foreign body. The bacterial flora of the cases studied varied. *Streptococcus viridans* was very prominent in the sputum; it was at times aerobic and at other times facultatively anaerobic. However, anaerobic streptococci and Gram negative bacilli were the organisms most frequently found in the abscess itself. Fusiform bacilli and spirochaetes in significant numbers were found in about one quarter of the cases, these organisms apparently playing a secondary rôle. The symptoms and signs in these cases presented nothing unusual. Cough was generally the earliest symptom and chest pain occurred frequently. The sputum was usually profuse and frequently offensive, but not always so. Gross haemoptyses were not uncommon. The pulmonary signs were very meager in many patients; the most common signs were dulness (43 per cent) and râles (40 per cent). The chief reliance for demonstrating the abscess proved to be the X-ray and frequently multiple films and positions were necessary. The most important X-ray change during the evolution of the abscess is at first an ill defined area of increased density which later becomes sharply demarcated, and in which there may finally develop a cavity with a fluid level. Care must be taken not to confuse the findings with tuberculosis or carcinoma. Bronchiectasis, with secondary abscess, is best differentiated by the long history and by lipiodol study. The importance of prophylaxis is stressed. This concerns itself mainly with eradication of infections in the nose, throat and mouth especially before operation. The type and depth of anaesthesia and the position of the patient during the operation are important. The aspiration of secretions from the trachea during and after operations and inhalations of carbon dioxide are frequently necessary. When the disease is established the general methods useful in combating any prolonged infection apply, and the patient should have a carefully supervised course of postural drainage. Steam-inhalations and ammonium chloride by mouth may make the secretions less viscid. Routine bronchoscopy is a very important step for localization of the abscess and may promote better bronchial drainage by permitting the sucking out of plugs of mucus and pus and the cauterizing of obstructive granulations. Arsenicals were not used routinely but only where spirochaetes and fusiform bacilli were numerous. There were 13 such cases. The mainstay of the medical treatment was, however, postural drainage and this was made as nearly continuous as possible. Surgical treatment is often withheld too long. This should be considered when a patient fails to show improvement after three to five weeks of conservative treatment, though the interval will vary from case to case. The trend now is toward earlier operations, but it should not be so early that the patient is not given a good chance for recovery under a medical regimen. The aim of surgical treatment should be to provide adequate drainage without contaminating the pleural cavity. This can usually be accomplished safely and efficiently by a two-stage operation, using the actual cautery for incision into the abscess. Chronic abscesses are more difficult to cure than early ones, hence the longer the duration prior to treatment the less favorable the prognosis. Multiple abscesses are also difficult to treat as are those complicated by pre- or postoperative haemorrhage and chronic alcoholism. Of the 50 successful results, 32 received medical treatment and 18 surgical treatment. Of the 38 unsuccessful cases, 25 received surgical treatment. Twelve of these had a preliminary course of medical treatment, however. The earlier treatment is instituted and the more carefully prophylactic measures are observed the better the results will be in curing and preventing this disease.—*Lung Abscess, Analysis of 88 Cases, A. M. Fisher & G. G. Finney, Bull. Johns Hopkins Hosp., May, 1940, 66: 263.*—(*J. S. W.*)

**Chronic Pneumonitis.**—The authors define chronic pneumonitis as an infectious process of the lung leading to sclerosis with or without formation of bronchiectasis and cavities. The conception of pneumonitis includes not only

chronic suppuration of the lung, but abscess, gangrene and other pathological conditions. The pneumococcus is present in 80 or 90 per cent of cases, and the streptococcus, staphylococcus and Friedländer's pneumobacillus may occur. Among the symptoms described are moderate cough, frequent or paroxysmal, with expectoration, which may be mucous, mucopurulent, bloody or foul. Fever, anorexia and anaemia reflect the constitutional damage. Clubbed fingernails and cyanosis may appear early. Pain reveals involvement of the pleura. Physical examination shows diminution of thoracic elasticity, atrophy, muscular contraction and alteration of the breath sounds. The following processes are able to produce chronic pneumonitis: lobar pneumonia, lobular bronchial pneumonia, lipoid pneumonia, infected atelectasis, abscess, the suppuration of cancer, hydatid cyst, pneumonoconiosis, syphilitic pneumonia, pneumomycosis and pneumonia from war gas.—*El concepto actual de las neumonitis crónicas, M. Celaya & V. Olguin, Rev. Med. Lat. Am., August, 1937, Avo* ***24:*** *1087.*—(*E. C. I.*)

**Pneumonia.**—Pneumococcus pneumonia in the U. S. A. is incomparably more frequent and serious than in France. Studies of fundamental importance were carried out by Bullowa and Greenbaum at the Harlem Hospital in New York City, by Finland and his collaborators in Boston and by Coryllos and Birnbaum of New York City. Acute lobar pneumonia has in the U. S. A. an average mortality of 30 per cent. The gravity of the illness has stimulated considerable laboratory research on the pneumococcus. Pneumococcus pneumonia takes three clinical forms: lobar, atypical and bronchopneumonic. The onset is usually a tracheobronchitis, grippe or a "simple cold in the head." Finland states that atelectasis is a frequent complication of primary lobar pneumonia which explains certain unusual physical signs and occurrences in the clinical course. Certain episodes of acute dyspnoea or even sudden death may be provoked by atelectasis in the course of pneumonia. At the Boston City Hospital, 62 cases of pneumonia with atelectasis have been observed between 1929 and 1936, and 47 of these have shown atelectasis of varying degrees at autopsy. Coryllos explained the mechanism of atelectasis by complete obstruction of a bronchus, the alveolar gases being absorbed by the blood stream. Experimentally, Coryllos produced both atelectasis and lobar pneumonia in dogs by an inoculation of virulent pneumonic sputum. In the new-born, atelectasis and pneumonia are provoked by obstruction of a bronchus by amniotic fluid or by epidermal cells. From a therapeutic aspect it is most important to identify the particular type of pneumococcus. Finland states that there are 33 types. In order of frequency they are types 1, 2, 3, 8, 6, 5. In infants the order of frequency is: 1, 6, 14, 19, 3, 4, 7. The treatment used is anti-pneumococcus serum of the horse. Finland uses intravenous injection of serum. Bullowa uses intramuscular injection in early cases. Contraindications to serum include very grave illness, asthmatics, those not desensitized to horse serum, the very old and those with other organic diseases. Oxygen is used for anoxaemia. To prevent bronchial obstruction the patient lies on the healthy side. Hospitals in the U. S. A. are well organized to handle pneumonia. In the U. S. pneumonia ranks third, but in France it is much less common.—*Traitement des pneumococcies pulmonaires d'après les travaux américains récents, O. Monod, Arch. méd. chir. de l'app. respir., 1938,* ***13:*** *no. 6, 466.*—(*J. E. F.*)

**Pneumonia.**—In January 1939 an epidemic of a mild disease of the respiratory tract occurred in Philadelphia; this reached widespread proportions in February. Similar outbreaks were reported in other cities. Since most patients were not ill enough to seek medical aid, it was not possible to learn the true extent of this pandemic. Clinically, these cases were similar to a series of patients with atypical pneumonia reported in 1938. In two cases of the latter group, a filterable virus, different from the influenza virus, was isolated. In the 1939 epidemic, at the Jefferson Medical College and Hospital, there were 407 cases, among the internes, nurses and medical students. Only about 100 were ill enough to be admitted to the hospital. The period of incubation was uncertain. The disease was primarily an in-

flammation of the mucous membranes of the respiratory tract, usually of the nose, pharynx and larynx, occasionally including the trachea and bronchi, and in a few cases the bronchioles and lungs. Constitutional symptoms were usually in proportion to the extent and intensity of the mucosal lesions. The clinical course was remarkably uniform in most cases, differing chiefly in severity. The patients were classified as mild (ambulatory), moderately severe and severe. Seventy-five per cent were mild. These cases would ordinarily be regarded as colds but because of their coincidence with more severe, but clinically similar, infections they were regarded as part of an epidemic of a single disease entity. The symptoms were referable to inflammation of the upper respiratory tract. There was occasional dry cough but rarely fever. The illness lasted from one to several days. About 100, or 25 per cent, were sick enough to go to bed. Of this number, 25 had tracheobronchitis and 25 had tracheobronchopneumonia. The onset in most cases, as in the mild form, was insidious. Over 70 per cent of this group had persistent hacking cough. Only 27 raised sputum, but never more than 30 cc. a day. The chief symptoms were anorexia, muscular soreness from coughing, vomiting and diarrhoea. Fever lasted on an average two and a half days in patients without involvement of the lungs, four and six-tenths days in those with tracheobronchitis and eight and two-tenths days in those with pneumonia. The temperature usually ranged between 101° and 103°F. The sputum, when present, was not characteristic and was occasionally blood tinged. The leucocytes ranged between 5,000 and 8,000, often with a slight increase in proportion of the polymorphonuclear cells. In 25 patients who developed pneumonia, the onset was insidious and signs of spread to the lungs appeared after several days. Fever was continuously high or occasionally remittent and the temperature declined by lysis. The disease with pneumonia lasted from two to seventeen days, with an average of eight and two-tenths days. All blood cultures were sterile. In a number of cases relapse, with mild nasopharyngitis, occurred after several weeks. The number of leucocytes was usually normal or slightly increased toward the end of the illness. Three patients developed jaundice five to seven days after the beginning of symptoms of nasopharyngitis; the clinical course was then typical of catarrhal jaundice. In 5 cases, after several days of the mild symptoms, typical acute follicular tonsillitis with leucocytosis developed. Aside from demonstrating the absence of the influenza virus, aetiological studies gave no decisive results. Various bacteria were grown but none was considered to be of aetiological importance. There was a remarkable scarcity of pneumococci. Treatment was symptomatic. Sulfapyridine and serum were tried in a few of the patients with pneumococci in the sputum, but the absence of a prompt response suggested that the pneumococci were of no aetiological significance. This epidemic disease is considered to be a clinical entity similar to epidemic influenza but caused by a different agent. There were no deaths in the entire series. The disease should be given a temporary general name, such as grippe, as differentiated from true influenza, until the aetiological agent is discovered. This agent is most probably a filterable virus.—*An Epidemic Disease of the Respiratory Tract, H. A. Reimann & W. P. Havens, Arch. Int. Med., January, 1940, 65: 138.*—(*H. R. N.*)

**Pulmonary Lues.**—Although this disease was first suspected by Paracelsus early in the sixteenth century, it was recognized as a clinical entity only within the last century, mainly through the exhaustive study of Virchow. Later, following the discovery of the bacillus of Koch, there was doubt regarding many diagnoses of pulmonary lues, and tubercle bacilli were found in the sputum of several of these cases. Some investigators believed that tuberculosis was superimposed upon the luetic process in the lungs, thus creating a confusion of the two conditions. When Schaudinn discovered the spirochaeta many clinical pictures appeared to have been cleared, but Koch and others threw doubt on the theory that the spirochaeta often found in pulmonary lesions was specific. Contemporary opinion as to the incidence of pulmonary lues varies; observers have found it at au-

topsy in from 1 per cent to 10 per cent of luetics. It is more frequently considered a complication of hereditary lues, showing a predilection for the midzone and the lower third of the lung, predominantly on the right; it occurs more often in men than in women, and in the age group, forty to fifty years. When pulmonary lues develops in a tuberculous lung, it often reveals latent lesions and increases their activity. On the other hand when pulmonary tuberculosis develops during the primary or secondary stage of lues, it assumes an exudative form, while during tertiary lues it frequently appears as pulmonary fibrosis. A complete case report is given of a fifty-eight year old woman in whom advanced pulmonary tuberculosis was diagnosed. Death occurred after a few days of observation from cardiac failure. At autopsy a hypertrophic heart and diffuse fibrosis of the right lower lobe were discovered. Histology apparently demonstrated pulmonary lues. Syphilis of the lung, though rare, should not be so difficult to diagnose, as many still claim. Anatomohistological examination without doubt affords all the necessary information for diagnosis, as well as for the differentiation of this process from others.—*La sifilide del polmone, V. Agnello, Lotta contro la tuberc., June, 1939, 10: 512.*—(*S. L.*)

**Pulmonary Actinomycosis.**—The authors report a forty-three year old white mechanic with fever, cough, chest pain, loss of weight and fatigue. Three physicians who examined him made a diagnosis of right basal pleurisy. Aspiration yielded bloody, purulent fluid. Radiological examination showed an obliterating pleuritis in the base of the right lung. Sputum examination was negative for tubercle bacilli on several occasions. Bronchoscopic aspiration showed normal bronchial mucosa. Bronchography demonstrated the pleural lesion. A month later a tumor with the characteristics of anthrax appeared in the lower lateral region of the right thorax, aspiration of which yielded negative results. Several bacteriological examinations were made, and also culture on Sabouraud's medium, with negative results. The patient became gradually worse and the lesion grew in size. Finally examination showed the presence of the actinomyces in the evacuated pus.—*Actinomicosis pleuro-pulmonar simulando en su comienzo una tuberculosis pulmonar, V. Martinez & F. Dominicis, Rev. de tuberc., January, 1939, 1: 33.*—(*E. C. I.*)

**Bronchitis.**—Eosinophilic catarrh of the bronchi is in no way identical with asthma. This syndrome arises in so-called allergic constitutions and is clearly to be differentiated from asthma. There are eosinophiles in the sputum but not always in the blood. A certain relationship to tuberculosis is probably present but not always easily proven. In *bronchitis mucinosa* or *fibrinosa plastica* bronchial casts are often coughed up, which can be recognized as ramifications of the bronchi to the finest bronchioles. Constitutional make-up plays an aetiological rôle in this form also. Bronchial spirochaetosis is caused by the *Spirochaeta Castellani* and is recognizable immediately on examination of the sputum. The spirochaetes, longer and thicker than *Spirochaeta pallidum*, are demonstrable with gentian violet and by Romanovsky method. The therapy is the same as for other spirochaetal bronchitides, namely: neosalvarsan.—*Über seltene Bronchialerkrankungen, G. Schröder, Deutsches Tuberk.-Bl., March, 1939, 13: 61.*—(*R. K.*)

**Infectious-Allergic Bronchitis.**—In 4 members of a family an infectious-allergic bronchitis with eosinophilia and loud râles was observed. The cause of this disease could not be revealed.—*Eine eigenartige infektiös-allergische Bronchitis, P. G. Schmidt, Ztschr. f. Tuberk., January, 1940, 84: 155.*—(*G. C. L.*)

**Congenital Bronchiectasis.**—From the casuistics of 66 of the author's cases and from reports in recent literature the arguments for the congenital nature of bronchiectasis are discussed. The frequency of the simultaneous existence of malformations or anomalies and bronchiectasis, as well as the frequency of its familial incidence and of its occurrence in identical twins, support earlier observers' conception of its congenital nature. The coincidence which is relatively frequently observed between bronchial asthma and bronchiectasis

is possibly explained by a bacterial allergy in the bronchiectatic patient. Observations on the incidence of chronic sinusitis in patients with bronchiectasis show striking agreement with the results which Kartagener's clinic reported earlier. The same also holds in relation to the size of the frontal sinus, which is considered to be an indicator of the importance of a constitutional factor in the aetiology of bronchiectasis.—*Erfahrungen an weiteren Bronchiektasie-Patienten, J. Hasler, Beitr. z. Klin. d. Tuberk., 1939, 93: 630.*—(*R. K.*)

**Aspergillosis in a Skunk.**—Aspergillosis in the lungs has been reported in practically all domestic animals, including dogs, and has been frequently reported in all the avian families in Europe and the United States. The authors report its appearance in a skunk. A cat was persuaded to serve as foster mother for 5 orphaned baby skunks. When about one month old they were operated upon for removal of the scent glands. The wounds healed well in all but one. Ten days after the operation this animal died. A dirty-gray diarrhoea was present and autopsy revealed all organs normal except the lungs. In the lungs there was a marked greenish discoloration with haemorrhage in the marginal areas of all the lobes, the alveoli were filled with a greenish watery fluid, and the primary and secondary bronchi showed catarrhal inflammation and a mucous exudate of greenish color. Mycelia of the mould could be demonstrated with cover-slip preparation and was identified as *Aspergillus fumigatus*. The animals had been kept in a basement with a concrete floor. The floor was damp and a mouldy grain was found on the floor which apparently was the source of the infection.—*Pulmonary Aspergillosis in a Skunk, A. J. Durant & E. R. Doll, J. Am. Vet. M. A., November, 1939, 95: 645.*—(*L. F. B.*)

**Cancer of Lung.**—In order to determine the effect of roentgen therapy on the histological picture of lung carcinoma, 21 patients who had received roentgen therapy and 64 non-irradiated patients, used as controls, were studied postmortem. Five irradiated metastatic lesions from carcinoma of the lung were also studied. All the cases, with two exceptions, were treated with 200 kv. Most of them were treated with 25 ma. with a few exceptions in which 5 and 10 ma. were used. The primary tumors were usually treated by using three 15 by 15 cm. thoracic portals, located anteriorly, posteriorly and laterally. In general, the histological changes produced by roentgen therapy were degenerative in the acute stage and retrogressive in the later stages, accompanied in some cases by profound alterations in cell type. Among the 64 nonirradiated controls many instances of degenerative and retrogressive changes were seen which resembled those observed in the radiated cases, yet the total pictures were different. In evaluating the changes seen in irradiated tumors, some reliance was placed on the comparative appearance of their metastases and on biopsy sections secured prior to therapy. The most acute changes consisted of intercellular and intracellular oedema, vacuolation of cytoplasm with an increased affinity for acid dyes and some actual cell necrosis. The later stages were those of disorganization of the architecture of the tumor and alteration of cell type. Frequently, adenocarcinomata lost their ductal or tubular appearance and became more undifferentiated and in squamous cell carcinomata the arrangement of cells into squamous epithelium-like layers was lost. The cellular changes following irradiation were those of anaplasia or increase in undifferentiation, rather than metaplasia. The cells became enlarged, some reaching giant size. The nuclei became more chromatic and were sometimes pyknotic. The nuclei tended to be enlarged, and multiple nuclei, ring nuclei and eccentrically placed nuclei were common phenomena. In the later stages there was also an increase of fibrous connective tissue in the tumor. In none of the 21 cases, in which doses up to 5000 r were used, was there complete destruction of the tumor. The smallest dose which produced visible damage was 1490 r, but the carcinocidal dose is probably above 5000 r. Study of 5 irradiated metastases revealed one skull lesion which appeared to have been completely destroyed by a dose of 3800 r; there was no effect on the other 4 metastases. Study of the tissues and organs adjacent to the

irradiated tumor revealed no changes aside from those usually seen in the skin following radiotherapy. Squamous cell carcinomata and adenocarcinomata were more radiosensitive than the undifferentiated carcinomata which, contrary to expectation, were either highly radioresistant or highly radiorecuperative. The average period of survival after the onset of symptoms in the 53 nonirradiated controls, where data were available, was 10.5 months. The 21 patients treated with roentgen rays survived for an average of 11.9 months after onset of symptoms. Careful study of the individual cases reveals that even this slight difference in survival time is only apparent, and that roentgen therapy in this series had no beneficial effect.—*Effects of Roentgen Therapy on Histologic Picture and on Survival in Cases of Primary Carcinoma of Lung, P. Steiner, Arch. Int. Med., July, 1940, 66: 140.*—(*H. R. N.*)

**Cancer of Lung.**—The observations are based on 88 cases. In 68 cases there was histological proof of the diagnosis of pulmonary carcinoma; in the remaining 20, there was strong clinical and roentgenological evidence. Weight loss is a common symptom; loss of 20 pounds or more usually signifies the presence of abdominal metastases. Chronic hoarseness, found in 10 per cent of this group, almost always signifies envelopment of the laryngeal nerve by the tumor mass. Haemorrhagic pleural effusion is almost pathognomic of malignant neoplasm. The most essential factor in the development and variability of the X-ray picture is the degree of bronchial occlusion. This determines the degree of secondary atelectasis and the amount of secondary abscess formation. Primary interest centered in the effect of roentgen therapy which was employed in 42 patients in this group. The dose ranged from about 1,200 to 16,000 r. There has been increasing recognition of the inefficacy of weak irradiation and the higher dosage has been used to a greater degree. Duration of life after the onset of symptoms in the patients who were treated was about the same as in the untreated patients. As a curative treatment, roentgen therapy was a complete failure. There may be an effect in the form of some symptomatic relief which is caused by a release of bronchial occlusion and clearing of atelectasis following some shrinkage of the tumor. Three patients reported disappearance of symptoms following roentgen therapy. However, this occasionally occurs without any therapy. Any roentgenographic changes which follow roentgen therapy seem to be due to clearing of the atelectatic area rather than to any real destruction of the tumor. Radiation sickness in the form of nausea, abdominal distress, severe headaches and general weakness was frequent in this series. Anaemia develops and transfusions have to be employed. The patient with hopeless pulmonary cancer dies an easier death without treatment. The literature offers no unequivocal example of cure of pulmonary cancer by roentgen therapy. Duration of life following diagnosis may be considerable without any treatment. The authors do not wish to discourage further work in the field of roentgen therapy in this disease. At present, the surgical removal of operable tumors must be the treatment of choice.—*Bronchogenic Carcinoma, R. Bloch & G. Bogardus, Arch. Int. Med., July, 1940, 66: 39.*—(*H. R. N.*)

**Cancer of Lung.**—The early recognition of bronchogenic carcinoma has not kept pace with the increasing realization of its frequent incidence. The authors in a study of 23 proved cases, emphasize the protean manifestations of this condition in part explanation of the failure to make early diagnoses. It has apparently been established that there is a real increase in the frequency of cancer of the lung. The aetiological factors remain obscure. The relative importance of chronic inflammatory processes, inhalation of irritating substances and hereditary susceptibility have their support. The primary growth is located more frequently on the right than on the left side, according to most statistical analyses. The site of predilection is the main bronchus or its larger branches. The hilar type of lesion is the most common. The main bronchus and the bronchus to the lower lobe on each side are the favorite locations for the neoplasms. Other varieties of primary growths are described as lobular and nodular, and are found in the peripheral lung fields, varying in appearance

from a similarity to miliary distribution, or infiltrative, to nodular, and even diffusely infiltrative or pneumonic in type. Histologically squamous, adenocarcinomatous and anaplastic varieties are recognized. The squamous cell type of tumor is the most common, but the classification of a tumor must be accepted with reservations, because different sections may present different microscopical features. A common cellular origin from epithelial basal cell deposits would predispose toward pleomorphism. The primary lesion spreads by way of the peribronchial lymphatics, and peripheral tumors often simulate metastatic or pleuritic growths. Pleuritic involvement may induce effusion into the pleural cavity. Extension to the regional and mediastinal lymph nodes is common, and mediastinal tumors may attain considerable size. The tendency of bronchogenic carcinoma to cause widespread and early metastasis is well known. The situation of the lung in the circulatory system would favor generalized haematogenous dissemination. Metastatic bronchogenic carcinoma is worthy of consideration in the case of any obscure intraäbdominal lesion. Secondary pathological features are common; the tumor may obstruct the bronchus by intrabronchial growth or by invasion of the wall, producing constriction. Obstruction causes defective drainage with consequent infection. Chronic bronchiectatic, suppurative, pneumonic and pleuritic phenomena in any combination may ensue. Atelectasis may complicate the obstruction and perpetuate the infection. The average age of the 23 cases in the series was fifty-one, and all but 4 patients were males. These tumors occur at an earlier age than one generally associates with malignant growth. Haemoptysis is the chief subjective sign. In this series, haemoptysis occurred in 34 per cent of the cases. Dyspnoea occurred in 38 per cent, and was the presenting complaint twice. Pain in the chest proved severe in 8 cases, in 5 of which it was the presenting complaint. Productive cough was present in 9 cases. Hoarseness occurred in 5 patients. Thirteen per cent of the patients had no symptoms referable to the respiratory tract. In 5 cases there were presenting complaints due to a remote metastatic manifestation of the disease. The direct roentgen sign is the presence of a fairly homogeneous shadow, well defined, usually at or near the hilum. This shadow may send extensions into the lung field. Indirectly there may be produced emphysematous or atelectatic phenomena resulting from partial bronchial obstruction. The atelectatic process is of slow development when compared to the atelectasis of foreign body origin. Mediastinal shift is greater with lesions of a lower lobe than with lesions of an upper lobe. Complete or partial collapse of the lung creates a favorable nidus for infection. Pleural fluid may be the result of extension of parenchymal infection of the lung or may be the result of pleural metastasis. In the series, there was direct roentgenographic evidence in only 6 cases. In 13 cases the presence of tumor could be inferred only from evidence of secondary pathological processes. Bronchoscopic examination should be done in all cases of obscure involvement with evidence of bronchopulmonary pathological change.—*Bronchiogenic Carcinoma: A Diagnostic Enigma, E. L. Jenkinson & A. F. Hunter, J. A. M. A., December 30, 1939, 113: 2392.*—(*G. L. L.*)

**Cancer of Lung.**—The only adequate methods available in the fight against cancer are radium, X-rays, fulguration and surgical excision. All forms of irradiation have up to the present time failed completely as curative agents. High voltage roentgen therapy does not prolong the lives of patients with carcinoma of the lung, because the great majority of the tumors are radioresistant. The failure of irradiation is not surprising, since the administration of a dosage sufficient to destroy the tumor without irreparable damage to the surrounding tissues is practically impossible. Treatment of primary carcinoma by endobronchial fulguration is, in the opinion of the authors, practical only in extremely rare cases. The outlook for the patient is now much brighter with the introduction of surgical excision of lung tissue as a practical procedure. Its future value will depend on three factors: (1) early diagnosis before metastasis has occurred, (2) a relatively low operative mortality rate, and (3) a reasonable chance of cure without excessive permanent disability. The general opinion now

is that all primary carcinomata arise from a single undifferentiated parent cell located in the basal layer of the bronchial epithelium. From a clinicopathological standpoint the symptoms and signs may be divided into several stages: (1) The stage before bronchial occlusion, characterized by irritating cough, clear, thin, mucoid sputum, with later blood streaked sputum following increase in growth and ulceration; physical manifestations and roentgenographic changes are not present during this stage. (2) The stage of bronchial occlusion, varying from partial occlusion with emphysema to complete occlusion with atelectasis and usually with secondary infection; characteristic symptoms, physical signs and roentgenographic manifestations accompany the varying degrees of bronchial occlusion. (3) The stage of extension or metastases, with its varying symptoms and signs unimportant clinically because indicative of a hopeless prognosis. In considering the effects of bronchial occlusion it is important to realize that the severity of symptoms and the prominence of changes will be directly proportional to the size of the affected bronchus. The authors present an analytical study of a series of 75 cases, all proven histologically, the ratio of men to women being 2.6 to 1. Fifty-seven lesions were located in the stem bronchus and 18 peripherally. Cough was present in 87 per cent of the entire group, fever in 53 per cent, chest pain or discomfort in 44 per cent, haemoptysis in 38 per cent and dyspnoea or wheezing in 38 per cent (frequently an early symptom). Roentgenographic changes were present in 96 per cent. Approximately three-fourths of all primary lung tumors are situated in the major bronchi, so that they can be bronchoscoped. In this series of 55 stem bronchus lesions a biopsy of tumor tissue was obtained in 53 instances. Bronchography should be used only if the results of bronchoscopy are negative. The demonstration of malignant tissue in the sputum has in a limited series of the authors' cases proved disappointing. Aspirational biopsy is a dangerous procedure, since pleural infection may follow withdrawal of a needle from an infected lung. Exploratory thoracotomy was carried out in 38 of the 75 cases in this series. Before thoracotomy is done, one should be sure that there is no clinical evidence of metastasis. In the group of 75 cases, lung resection was carried out in 21, pneumonectomy in 17 and lobectomy in 4. Fulguration was possible in only one instance. In the final analysis there were 18 cases (24 per cent) in which no evidence of metastasis or extension of the tumor was found at the time of the operation. Of the 4 lobectomies, one is alive and well sixteen months after operation. Of 17 pneumonectomy cases, 8 are living and well with no evidence of recurrence, the longest postoperative period being five years and four months. Lobectomy and pneumonectomy are practical therapeutic procedures offering a good chance of survival and without excessive operative mortality. Bronchoscopic examination is by far the most important diagnostic procedure available and should be used without delay in any case in which symptoms suggestive of early primary carcinoma of the lung cannot be definitely explained on some other basis.—*Clinical Studies of Primary Carcinoma of the Lung: An Analysis of Seventy-Five Cases, Twenty-One of Which Were Treated by Pneumonectomy or Lobectomy, R. H. Overholt & W. R. Rumel, J. A. M. A., March 2, 1940, 114: 735.*—(*G. L. L.*)

**Cancer of Lung and Subpleural Scars.**—This is a study of material obtained at autopsy from fifteen cases of carcinoma of the lung originating in the vicinity of subpleural scars. The carcinomata themselves contained anthracotic scar tissue. The scar tissue was frequently extensively hyalinized consisting of nodules containing very few cells or appeared as an agglomeration of connective tissue with hyalinization of the fibrous substance and keloid formation. In five instances cholesterol crystals were present in these scars. Occasionally the fibrous material was rich in fibroblasts. The scar was usually drawn up to the pleura by fibrous bands radiating from the tumor. In the immediate vicinity of the scar the tumor was usually necrotic leaving only a trace of the cellular proliferation. Alveolar structure was represented only by remnants of elastic tissue. In the necrotic central sections of the tumor tissue itself, cholesterol

crystals and anthracotic pigment might be present. In one instance alveolar remnants were observed in the hyaline scar. It is postulated that these cancers are "scar cancers," for the scars themselves are too old to have occurred secondary to the tumor. Support is lent to this idea by the presence of scar tissue containing coal pigment in the centre of the cancer. There arises the possibility of a relationship of tuberculous infection to these cancers. Tuberculous scars accumulate anthracotic pigment much more readily than other types of scars. In several cases there were signs of old tuberculosis in the scar itself or in other parts of the lung.—*Periphere Lungenkrebse auf dem Boden pleuranaher Narben, G. Friedrich, Virchows Arch., July, 1939, **304**: 230.*—(*C. L. D.*)

**Cancer of Lung.**—In order to obtain further information regarding these tumors, 40 necropies were studied. Based on morphological characteristics, these neoplasms fell into two groups: squamous cell carcinoma and cylindrical cell carcinoma. A third group, pleomorphic cell carcinoma, was added in which the tumor presented more than one cell variety. In this classification, cylindrical cell carcinoma included adenocarcinoma, and undifferentiated cell carcinoma, such as medullary, round cell and oat cell carcinoma. Two cases of the 40 showed no metastases. The greatest number of metastases occurred among the cases with adenocarcinoma. It seems evident that these different forms of tumor cells have originated from the deeper basal cell layer lining the mucosa of the bronchial tree. The basal layer of epithelium is the least differentiated and possesses the various potentialities for growth and cell differentiation. It is believed that the various epithelial growths have, in all probability, a common genetic origin and that they are all capable of responding to the same growth stimulant.—*Primary (Bronchiogenic) Carcinoma of the Lung, J. Rabinovitch, L. A. Hochberg & M. Lederer, J. Thoracic Surg., February, 1940, 9: 332.*—(*L. F. B.*)

**Metastases of Cancer of Lung.**—Forty cases of bronchogenic carcinoma are analyzed with respect to metastasis. The chief sites of secondary growth were the anterior mediastinal and tracheobronchial lymph nodes, which were involved in 32 and 23 cases, respectively, of the series. Metastasis to the lymph nodes of the abdominal cavity was less frequent, with 6 in the mesenteric lymph nodes, 2 in the lumbar-aortic and one each in the coeliac, hepatic and pancreatic nodes. There were 10 cases of secondary growth in the supraclavicular nodes. Of the viscera, the liver was involved most frequently, *viz.*, in 16 out of the 40 cases. The kidneys were affected in 14, the suprarenal glands in 10 and the myocardium together with the pericardium in 5 cases. Metastases to the skeletal muscles occurred in 3 cases. The ribs were the seat of secondary growth in 5 cases and the vertebral column and sternum in 2 cases each. Metastases were observed in the skin in relatively few instances. The central nervous system was not examined regularly in the series and hence figures are not given for metastases in this system.—*Las metastases en los canceres bronquiales, J. A. Jimenez & P. A. Castillo, Arch. de. med. int., 1939, 5: 264.*—(*E. R. L.*)

**Pneumonectomy for Carcinoma.**—Recent autopsy studies have shown the incidence of pulmonary carcinoma to be as high as 10 per cent of all carcinomata. According to the literature, approximately 100 patients have undergone pneumonectomy for carcinoma. Six have survived five years without evidence of recurrence. As with other carcinomata, early diagnosis is of great importance. The textbook picture of great weight loss, chest pain, pleural effusion, copious sputum and haemoptysis represents a late phase of the disease. Among the common early symptoms are persistent cough, blood streaking, thoracic discomfort, slight weight loss, and slight anaemia. Adequate roentgenographic examination is of the greatest importance. Bronchoscopy and biopsy will confirm the diagnosis in approximately three-fourths of the patients. Aspiration biopsy probably should be reserved for neoplasms at the lung periphery and should follow attempted diagnosis by bronchoscopy. Lobectomy for carcinoma is to be condemned. Even with peripheral tumors the necessary mass ligation used in lobectomy is inadequate

and unsurgical. The rational procedure is total pneumonectomy with individual ligation of the hilar structures, high amputation of the stem bronchus and thorough dissection of the mediastinal lymph nodes. Preoperative preparation should be adequate. A high caloric, high vitamin diet with vitamin concentrates is given. Anaemia is corrected and transfusions given when necessary. Where possible, a pneumothorax is established and approximately 70 per cent of the lung is collapsed. This allows for compensatory readjustments in breathing and in circulation. The pleural cavity is vaccinated by 50 cc. of sterile beef broth containing one per cent peptone forty-eight to seventy-two hours before surgery. Intratracheal cyclopropane anaesthesia is preferable. The authors prefer the anterior approach. The hilar structures are ligated separately. The phrenic nerve is crushed above the pericardium. Novocain is injected into the pulmonary plexus of the vagus nerve; this is important in quieting the cough reflex. Ligation of the artery should precede ligation of the veins; this will ensure that blood is not pumped into the lungs and lost. The bronchus is treated according to the method of Rienhoff. All visible lymph nodes are carefully removed. If there has been no gross contamination of the pleura, the chest is closed without drainage. A pneumothorax needle is introduced and the pressures are adjusted well on the negative side. If the pleural cavity is grossly soiled during operation, air tight closed drainage should be instituted before the patient leaves the table. Postoperatively, intranasal oxygen is always administered for several days. Intrapleural aspirations of fluid and air are performed every twelve to twenty-four hours as long as fluid forms. When there is evidence of infection or a leak in the bronchial stump, immediate underwater drainage is instituted. If the drainage is not performed without delay in case of bronchial leak, the patient may drown in his own secretions. Five illustrative cases with one operative death are reported.—*Pneumonectomy for Bronchiogenic Carcinoma, P. C. Samson & E. F. Holman, West. J. Surg., May, 1940, 48: 275.*—(*H. R. N.*)

**Silicosis.**—The authors, with the help of a number of physicians in various parts of the country, made a survey of the silicosis problem and this paper presents the results of that survey. The diagnosis of silicosis depends upon accurate interpretation of satisfactory roentgenograms, preferably stereoscopic films. The elimination of the X-ray specialist in the diagnosis of this disease has, no doubt, led to unfairness to the laborer and to the industry which he serves. Roentgenograms of persons who have inhaled quantities of certain mineral dusts over long periods of time show findings that are not observed in those not so exposed. Those exposed to certain mineral dusts show marked changes in the forms of deposits of tissue composed mostly of collagen. The amount of morbid tissue may be so slight that it is not discernible to the naked eye and even may be overlooked on microscopical examination, or it may be so great as to practically fill the thoracic cage. But even slight deposits of morbid tissue are quickly discernible to the trained eye and well recorded by the standard photometer. The distribution of inhaled particles in the lung is bilateral and relatively symmetrical. Much of this material is laid down along anatomical structures, but nodules or spherical whorls of collagen do not conform to anatomical structures. Roentgenological findings may be considered as to the characteristic pattern as seen in the roentgenogram and the regional distribution of densities on the roentgenogram. Tissue deposits in pneumonoconiosis fall into four main patterns and two or more of these may be seen in the same X-ray film. The four patterns described are: accentuated hilar and linear markings, nodules, pockmarks, and general nondescript haze or cloudiness. The first considered, the accentuated hilar and linear markings, is the type described by Pancoast as the perivascular-peribronchial lymph node manifestation of pneumonoconiosis. The shadows are due either to dust laden phagocytes caught in a "traffic jam" on the way to the hilum, or to deposits of collagen around blood vessels and bronchi, or to a proliferation of fixed cells. Subjects exposed to relatively small amounts of some mineral dusts often manifest a definite increase in the density and size of the hilar

shadows. These infiltrations or deposits may involve the nodes or extend out along the branches of the large blood vessels and bronchi. Others with the same dust exposure develop accentuated hilar markings in the middle third of the lung. The markings run parallel to medium sized bronchi and blood vessels. Likewise accentuated linear markings may occur in the peripheral third. Here the lung markings are fine and lacy and are due to collagen deposits along the terminal vessels and bronchi. Increased markings in this area may produce general mottling and in the past this particular type has not been differentiated from other patterns. Accentuated linear markings are a definite manifestation of pneumonoconiosis, but the lesion is of little clinical significance in the early or even moderately advanced stages. The subject usually lives to old age without suspecting that he has a lesion in the lungs. This type of a lesion is a social and economic problem to both labor and industry, for a patient who is able to work and wants work may not be able to get another job because he has such a lesion. Industry, on the other hand, does not want to assume the responsibility of compensation for a man with such a lesion who is able to work but does not want to. Legislative acts do not differentiate between this type of pneumonoconiosis which does not require compensation and the more serious types which deserve compensation at some stage in the disease. Nodular silicosis is the conventional type on which the diagnosis and even the definition of silicosis is based. The nodules are composed of collagen laid down like layers of onion, are bilateral, symmetrical and separated from one another by ventilated lung. Later they may grow together in round masses in the midlung field resembling a pawnbrokers sign. On X-ray they appear as white spots on a dark background. The authors' observations indicate that these nodules, considered pathognomonic of silicosis, are frequently not caused by silica. Light and dark field examinations of nodules show an overwhelming preponderance of black flecks that are not silica crystals and only a relatively few refractive crystals of silica. Therefore, it seems irrational to consider silica crystals as the aetiological factor in the development of nodules. The lungs may be shot full of these without the patient having dyspnoea or any other symptoms and these persons may live to old age without knowing that they have nodular pneumonoconiosis. Such persons are able to carry on hard labor at the prevailing wage. One, therefore, questions whether they should be prevented from getting jobs or lose the jobs they have. Legislative acts are formulated primarily around this type. "Pockmarks" are seen as numerous small areas of diminished density causing black spots about one-eighth of an inch in diameter surrounded by a white ring of increased density in the roentgenogram of individuals subjected to certain mineral dusts. This is the direct reverse of the nodule. The lesions are bilateral and relatively uniform in distribution, though more marked in the peripheral one-third. They may be more advanced on one side. The dark spots are caused by air cysts in the lung which are surrounded by lung tissue made relatively dense by collagen laid down in the form of whorls or strands. The cysts correspond anatomically to terminal lobules. As the condition progresses the pockmarks may be obscured and the mottling caused by them is increased in density by the laying down of collagen until the mass becomes a relatively solid area. These cysts are of more clinical significance than nodules and are more apt to be associated with dyspnoea, but they should not be used as the only criterion to determine whether the patient is incapacitated for work. Since these air cysts, with the pockmarking which they cause, have not been recognized before, they play no part in legislative acts. The authors believe that their occurrence in relatively dense lung may play an important part in determining when compensation should begin. Rapidly developing or acute silicosis is seen in the roentgenogram as a general haze or diffuse cloudiness which obscures normal lung markings. This haze is caused by thickening of the alveolar wall, incomplete filling or consolidation of alveoli and air passages with various types of material and envelopes of collagen surrounding the smaller blood vessels and bronchi. The perivascular and peribronchial deposits of dust-laden phagocytes, the laminae of collagen and the nodular whorls

and the areas of massive collagenization are absent or extremely scanty in this type, even in the terminal stage. The alveolar walls may be eight or ten times normal size due to deposits of collagen in certain regions and intense dilatation and engorgement of the capillary network in others. Collagen about the vessels results in marked constriction of the vessels so that there are avascular areas and hypervascular areas. This type presents a serious economic and social problem. Those afflicted deserve adequate compensation as soon as the diagnosis is established and certainly as soon as dyspnoea develops. Injustices have been done in the past because the roentgenograms did not show definite nodulation and consequently there was a tendency not to consider the lesion silicosis and therefore not within the law. As pneumonoconiosis progresses, the pathological tissue is increased so that massive deposits of collagen may obliterate the pattern. This occurs in three regions of the lung. In the midlung field the deposits take the form of a pawnbroker's sign on the right; on the left one of the masses is usually missing. A large deposit of collagen may be found at the apex of the lower lobe, the upper surface of the shadow being well defined and resembling the dome of the diaphragm while the under surface is irregular and fades into the mottling of the rest of the lung. Masses of collagen with no characteristic pattern may develop in the upper lung fields and vary in size. As massive collagenization progresses the blood supply is impaired permitting inflammatory lesions to develop. Infections, pyogenic, tuberculous, or both, may be engrafted in areas of massive collagenization or in avascular areas. While displacement of the trachea and interlobar fissures does not occur, tenting of the diaphragm, obliteration of the costophrenic angle and obscuring of the left border of the heart are frequently observed when an inflammatory process is superimposed on pneumonoconiosis. Cavities may be found as the result of the breaking down of tuberculous or nontuberculous inflammatory areas of collagenization. Spontaneous pneumothorax, usually occurring near the apex, and split pleura occurring high upon the lateral wall, two or three inches from the apex may also develop. When there is an increase in the linear markings or nodules present, the differential diagnosis may be somewhat difficult. The former type of pneumonoconioisis must be differentiated from pneumonia, inflammation due to postnasal dripping, the chronic passive congestion of cardiac decompensation, neoplasms and bronchiectasis, while in the nodular type pulmonary tuberculosis, miliary tuberculosis, yeast infection, neoplastic metastases, actinomycosis or lobar pneumonia may have to be ruled out. Pockmarks are readily differentiated from lobular pneumonia. The diffuse haze of the acute lesion is rarely seen in other diseases. A regional approach to diagnosis is also described. With this method, films are best observed at some distance, squinting the eyes so that one does not see the pattern. The lung field is then considered in three divisions—the apex, midlung field and base. It was found that by using the photometer or "electric eye" that the amount of light passing through the negative could be accurately determined and the densities of various diseases charted and graphed. Five readings with the photometer were made on each lung. In a normal lung the graph took the form of a capital V with a proximal vertical arm. Pneumonoconiotic lungs showing increased marking gave a capital W for each lung while the graph of a tuberculous lung resembled a square root sign for one lung and a W for the other. Typical readings of a neoplastic lung gave a capital V with the distal arm vertical. It is believed that with this accurate way of measuring densities and charting results an unbiased interpretation of lung densities is available which would be of value in industrial surveys for it would enable the roentgenologist to differentiate increased lung markings of pneumonoconiosis from other lesions and aid in differentiating the morbid changes due to dust in different industries. The general principles and technique of chest ray films is discussed and a plea made for standard distance, good penetration and adequate, but rapid time exposure.—*The Roentgenologic Diagnosis of Pneumonoconiosis (Silicosis) and Use of the "Electric Eye" to Determine Regional Densities, L. G. Cole & W. G. Cole, Radiology, September, 1939, 33: 261.—(G. F. M.)*

**Silicosis in Slate Quarriers.**—A survey of 117 workers in the slate quarry industry in Blaenan Ffestiniog, Merionethshire shows that silicosis of some degree was present in 62.4 per cent of those examined. The occurrence of tubercle bacilli in the sputum is high in both the entire group and the silicotic group: 15.6 per cent and 12.5 per cent, respectively. The industry contributes to this high morbidity and mortality from pulmonary tuberculosis. More careful study is warranted with a view to inclusion of this industry in the Workmen's Compensation Act.—*Silicosis in Slate Quarry Miners, T. W. Davies, Tubercle, September, 1939, 20: 543.*—(*A. P.*)

**Prevention of Silicosis.**—The coöperation of siliceous and nonsiliceous dusts in the origin and development of silicosis was investigated partly with regard to the possibility of obtaining practical methods of preventing silicosis by inhalation of harmless dusts, and partly with regard to the existence of dusts which conceivably enhance the toxicity of silica. The foremost inorganic nonsiliceous dusts tested were coal, soda, calcium hydroxide, aluminum hydroxide, metallic aluminum, iron oxides, and magnesium oxides. Siliceous dusts included quartz, colloidal and amorphous silica, leptite, cement and glass. These substances were tested separately and in various combinations. Most of the mixed tests were done with quartz dusts. Particle size varied but a great part of the dust was under 10 micra and to a great extent under 5 micra. Experiments were conducted by subcutaneous injection, by blowing the dust into the trachea of rabbits and by inhalation in dust chambers. The experimental animals were rabbits and guinea pigs. Chemically indifferent dusts, such as coal, had no effect on the development of silicosis, either inhibitive or promotive. Inhalation of alkaline dusts, such as soda and calcium hydroxide often caused irritations in the lungs and necrosis with inconsiderable fibrotic response. Similar changes appeared when these dusts were mixed with silica but there was no direct sign that the toxicity of the silicon was increased by the presence of alkaline dusts. These animals showed great susceptibility to pulmonary infections which, in early stages, led to death in the silicotic animals. Positively charged metallic dusts may diminish the toxicity of the negatively charged silica. Aluminum dust, especially in pure metallic form but also as the hydroxide, considerably retarded the development of silicosis and had an inhibitive effect upon the development of fibrotic reactions. Iron and magnesium dusts also possessed a certain but slight inhibitory effect upon silica. In studying silicosis attention must be paid to the different basic dusts that commonly occur with silica in the air. These experiments suggest that greater attention should be given to the composition of inhaled dusts and to the combined effect of the separate products.—*The Prevention of Silicosis: Experimental Investigations on the Action of Certain Non-Siliceous Dusts and Silica in the Origin and Development of Silicosis, C. Naeslund, J. Indust. Hyg. & Toxicol., January, 1940, 22: 1.*—(*L. F. B.*)

**Silicosis and Asbestosis.**—The first factor in the development of silicosis is the entrance into the pulmonary lymphatics of excessive quantities of silica crystals. These particles are imprisoned in fibrous tissue which forms about them. The second and most important factor is the activity of tubercle bacilli which, most commonly, enter after the aspiration of the silica dust. The quantity of silica particles necessary to produce disease is not known. In order to enter the lymph channels and produce a lesion the particles must be less than 5 micra in size. These silica particles produce fibrous tissue which, when it is widespread and diffuse, results in mechanical impairment of pulmonary function. Furthermore, silica particles facilitate the multiplication of tubercle bacilli. When combined with glass, brick, or cement, silica particles do not produce the same effects as free silica. Only a small proportion of those exposed to silica particles develop silicosis. In 1924, of 2302 miners who had worked in the gold mines of South Africa for a period of ten years, 176 were suffering with silicosis. The great majority have escaped either because they have avoided tuberculosis or because they have not inhaled sufficient silica particles. However, it appears that many miners who have been exposed to

the dust for a long time may develop the disease a long time after they have left the dusty atmosphere, particularly when tuberculosis supervenes. In its preclinical form the disease is called latent silicosis and there is no way of diagnosing it at this stage. Silicosis, without tuberculosis, affects the general health only slightly. When tuberculosis is associated, the so-called infectious silicosis, the disease is serious and usually rapidly progressive. The diagnosis of simple silicosis is often a difficult matter and requires a long period of study with frequent roentgenograms. Careful sputum examination is necessary to rule out an associated tuberculosis. There is a question as to whether silicosis occurs among asbestos miners. Asbestos is essentially a hydrated silicate of magnesium also containing small amounts of iron and aluminum; analysis reveals it to contain 39.62 per cent of silica. In the process of extracting asbestos a tremendous amount of dust is created, most of which escapes into the atmosphere. The author is unable to state with any authority whether these asbestos particles can produce silicosis. In the regions of Thetford mines, East Broughton, Lac Noir and Vimy Ridge, there are 2162 asbestos miners but these men have never been studied from the standpoint of silicosis. In any case the author does not believe that silicosis exists in any significant degree as an independent disease. Silicosis may be physiological, as anthracosis is physiological. Silica particles may be found in the lungs shortly after birth. The normal adult, not working in a siliceous atmosphere, may have as much as 1 to 2 g. of silica in his lungs and bronchopulmonary lymph nodes. The author has been unable to discover any characteristic radiographic or clinical findings which would separate pure silicosis as a separate disease. It is the associated tuberculosis which produces all the well known clinical and X-ray findings. In the same way, one no longer speaks of silicosis among asbestos miners but rather of asbestosis. According to other observers, asbestosis is an insidious disease accompanied by dyspnoea and cough, with expectoration, not infrequently, of asbestos particles. This disease occurs in those who have worked in the industry for at least seven to eleven years. Asbestosis does not predispose to tuberculosis. Death is usually caused by pneumonia, bronchitis, influenza, and very rarely by tuberculosis. The X-ray picture presents a coarser outline than that of silicosis. Observations in various mines have demonstrated that good ventilation combined with the use of masks will protect the miners from the injurious effect of the asbestos particles. In view of many contradictory opinions in the fields of silicosis and asbestosis, the whole subject requires further study.—*Mines D'Amiante, Silicose, amiantose, A. Sirois, Laval méd., September, 1939, 4: 275.*—(*H. R. N.*)

**Experimental Silicosis and Pneumonia.**—To check the validity of the supposition that the silicotic lung may be more vulnerable to infection with the pneumococcus, as it is to tuberculosis, experiments were designed to determine the effect of silica on the growth of the pneumococcus in artificial media and in the living animal. Both particulate and colloidal silica were added to the culture medium. There was no difference in the growth of Type-III pneumococcus organisms obtained on the experimental and control media. Normal and silicotic rabbits were inoculated intracutaneously with an avirulent strain of Type-III pneumococcus. The silicotic rabbits were neither more susceptible nor more resistant to the organism than the control animals. An attempt was made to infect the animals by inhalations. All the animals remained active and apparently well and the experiment shows that silicotic rabbits differ in no respect from normal rabbits when subjected to an atmosphere filled with pneumococci. The reaction in both normal and silicotic rabbits to intrabronchial injection of avirulent bacilli was similar. The virulence of the attenuated pneumococci was not increased in the silicotic animals. The reaction in animals receiving virulent bacilli was similar in both normal and silicotic groups and, although the number of animals used was small, it is noteworthy that mortality was about 25 per cent higher in the control group. Rabbits that had survived a previous pneumococcus infection were reinfected with virulent pneumococci intrabronchially. The survival rate was higher in the

silicotic animals of this group. In all the experiments, the silicotic nodules were resistant to the action of the pneumococci and retained the characteristics of such lesions in rabbits. The presence of silicosis had no influence upon the well defined immune reactions to Type-III pneumococci that can be elicited in normal rabbits. The small number of observations suggest that the presence of silicosis might enhance the resistance of the rabbit to Type-III pneumococcus infection.—*Silicosis and Type III Pneumococcus Pneumonia; An Experimental Study, A. J. Vorwald, A. B. Delahant & M. Dworski, J. Indust. Hyg. & Toxicol., February, 1940, 22: 64.*—(*L. F. B.*)

**Silico-tuberculosis.**—It is thought that the problem of silicosis in industry has been fairly well eliminated and that in those states having compensation laws most cases suffering from silicosis have been brought to light, but there is still a significant number of men exposed to silica years ago who are now being seen with silicosis and superimposed tuberculosis. Therefore, a report of the experience with silico-tuberculosis over a five year period in a hospital serving the industrial community of Detroit is presented. In such an industrial centre there are or have been many possible silica dust hazards in the various industries and also many workers who have migrated to Detroit in recent years following exposure to silica in some other community. Among 171 men admitted with a tentative diagnosis, 132 were definitely found to have silico-tuberculosis. This represents 3.37 per cent of males admitted to the hospital from 1933 to 1938. The occupations of the group have been varied, but foundry workers outnumber all others, 73 belonging to this group, while 28 were miners. The length of exposure is quite great and in many instances the interval since the last exposure and the time of diagnosis is quite protracted. The average age at the time of diagnosis was 50.2 years, the average exposure 17.4 years, and the average interval since exposure 4.9 years. The diagnosis of silico-tuberculosis is not always easy and must rest on the diagnosis of two coexisting conditions. For tuberculosis the diagnosis is based on X-ray evidence, sputum analysis, cavity formation and symptoms; for silicosis the criteria are X-ray appearance, history of exposure to silica dust and symptoms. Treatment is unsatisfactory and attended by practically no success. Uncomplicated silicosis has no treatment and tends to progress. For tuberculosis alone, bed rest and the various forms of collapse therapy are successful in many instances, but in the presence of silicosis collapse therapy is usually contraindicated. Thus bed rest is all that remains and this is not sufficient except in a few mild silicotics with little tuberculous involvement. In a group of 21 considered to have a better than average outlook, collapse therapy was employed, but only 2 can be said to have done well. One received pneumothorax and one received phrenic surgery. In previous years other cases were tried with equally poor results. The respiratory function is difficult to determine and the vital capacity gives no inkling of lung impairment in many instances. This is especially true of silicotics. A method of measuring the pulmonary function has recently been devised by Whitehead and reveals that these persons are bordering on serious embarrassment and would, of course, be unable to stand further inroad on their respiratory function by any collapse procedures. The seriousness of the condition is further borne out by the fate of the 132 cases. Seventy-seven are dead, 33 are in the hospital and 22 were discharged alive. Of these 7 have been lost to sight and only a few of the other have done well. Tuberculosis alone has a far better prognosis even in advanced cases. An accurate diagnosis is most important, for the silicotic patient does not need bed rest and may be endangered by admission to an institution where there are open cases of tuberculosis. The tuberculous individual without silicosis should have silicosis ruled out since the prompt use of collapse therapy may be of great value to him.—*Silico-tuberculosis as Seen in a Large Industrial Center, B. H. Douglas & E. Tompkins, Radiology, April, 1940, 34: 405.*—(*G. F. M.*)

**Dust Particles Removed by Breathing.**—An apparatus was devised using two thermal precipitators for measuring the percentage number of siliceous dust particles of different

size removed from dust-laden air by breathing. About 25 per cent of particles of size 0.2 micron and about 80 per cent of size 2 micra were removed. Between these two sizes the percentage removal was nearly proportional to the square root of the size. Above 3 micra the percentage removal gradually increased until at size 5 micra about 95 per cent of the particles were removed. It has not proved possible to explain the square root relationship found between size and percentage removal, theoretically, but the calculated displacements due to a combination of sedimentation and Brownian motion appear to be quite adequate to account for the removal of the particles. It appears likely that larger particles will tend to be deposited in the larger air passages and with decrease of size there will be a tendency for the particles to be deposited in smaller air passages. Owing to the subsequent expulsion of particles from the larger air passages by physiological mechanism, the size distribution of dust in the inhaled air may be some guide to the size distribution of the dust ultimately retained by the lungs.—*The Percentage of Particles of Different Sizes Removed from Dust-laden Air by Breathing, A. M. van Wijk & H. S. Patterson, J. Indust. Hyg. & Toxicol., January, 1940, 22: 31.*—(*L. F. B.*)

**Hydatid Cyst.**—Only 44 cases of echinococcus cysts of the lung or pleura have been noted in the literature of the United States and Canada. The disease is prevalent in Australia, Iceland, South America and some of the Mediterranean countries. Hydatid disease of the lung has occurred in only 5 patients known to have been born in North America. Two additional cases are reported. Both patients had emigrated from countries where the disease is prevalent: Greece and Argentina. The first patient was a thirty year male who, in childhood, had often played with dogs on a sheep ranch in Greece. At the age of sixteen he noted the onset of cough and right chest pain. After spontaneous subsidence, these symptoms recurred at the age of twenty-one. Thoracotomy was done for a right pleural effusion. During the daily dressings, he noted that numerous whitish cysts were expelled from the wound. The wound closed and he remained well until 1931 when symptoms reappeared and he was first seen by the authors. Previously he had also expectorated a "broken cyst." Roentgenograms disclosed a large smooth-walled, rounded mass occupying the lower outer quadrant of the right chest. A large echinococcus cyst was removed from the lung in two stages. The postoperative course was uneventful. He has remained well for seven years when last seen. The second patient was a twenty-five year male who had worked on a sheep ranch in Argentina. His symptoms had begun in 1927 with sharp left chest pain followed by cough and thick gray sputum which later became thin, watery and foul. In July, 1928, pneumothorax was instituted for haemoptyses but had no effect and was promptly discontinued. He was first seen by the authors September, 1928. The preoperative diagnosis was interlobar empyema with bronchial fistula. At operation no pus could be found and a small pulmonary abscess was diagnosed. Nothing further was done, symptoms subsided and he was discharged. Slight expectoration continued but the increasing severity of the symptoms led finally to readmission in October, 1931. Hydatid disease was first suspected when patient stated that he had expectorated a piece of "skin." An echinococcus cyst of the left upper lobe was removed in one stage. The patient has remained well for six years when last seen. The presence of hydatid disease in domestic animals of the United States has been definitely demonstrated. However, the distribution is not general and appears to be more common in certain sections of the South. Special investigations of this problem have not been carried out in many sections of this country.—*Hydatid Cysts of the Lung, C. Haight & J. Alexander, Arch. Int. Med., March, 1940, 65: 510.*—(*H. R. N.*)

**Lung Cysts.**—Lung cysts may consist of air cysts or pneumatoceles and fluid cysts, the latter being true cysts which may discharge their contents and become air cysts. The lesions may consist of multiple thin-walled pneumatoceles found near the larger bronchi in hilar areas known as cystic bronchiectasis,

multiple small thick-walled cavities giving a honeycomb appearance, and fluid cysts. All of these probably arise as the result of definite anomalies in the lung structure, either congenital or acquired, as the result of infection and fibrosis. The bronchiectatic or honeycomb types may arise from arrested growth of a bronchial bud. They have a mucous membrane lining. If an infection does not occur, these patients go on without any manifestations. A wide open communication is present between them and the larger bronchi and air enters and leaves readily with each respiration. This type of pneumatocele is seldom seen in the periphery of the lung. The fluid cysts, seen as areas of increased density, frequently are centrally located near the hilum but may occur anywhere in the lung. They may show little change over long periods of time without evidence of inflammation or infection. After a time they usually discharge their contents into the bronchi. After this they may become filled with air or completely disappear. The differential diagnosis is difficult for they may be confused with new growth, a localized pleural effusion or interlobar effusion. The lung defect here is probably due to failure of a bronchial bud to undergo proper tubular development resulting in complete or partial atresia of the lumen. A subsequent resumption of growth and expansion of the distal portion may produce a cavity with secretory epithelium. Certain mechanical factors play a part in the inflation of pneumatoceles. When there is free bronchial communication, the factors determining the inflation of the sac are the ratio of the resistance of the cavity wall to the resistance of the normal alveolar structure supplied by a bronchiole of the same size. Thus if there is free passage of air, the air in the cyst should never exceed atmospheric pressure except in expiration when a check-valve action is present. Cysts remaining the same during inspiration and expiration have a check-valve action of some type and may produce displacement of the mediastinal structures on expiration. Some cysts continue to expand forming balloon cysts and obviously are due to more than simple check-valve action. Such cysts are probably due to a check-valve and an accessory air chamber producing some pump-like action during respiration. A local pleural effusion could result in a pneumatocele and with a check-valve action produce a cyst appearing to be in the lung. Lipiodol does not enter cavities where there is no free communication and is of little value in diagnosis. Pneumatoceles arising from peripheral tissue are usually thin walled, often multiple and may be bilateral. They do not seem to be preceded by fluid cysts and have no secretory lining. In the anteroposterior view they may have the appearance of pneumothorax. Pneumatoceles of this type constitute the bulbous form of emphysema and may show no change for long periods of time, or may continue to enlarge almost completely replacing the lung structure. It is possible that they may occur as the result of congenital defects in the elastic structure of the alveolar walls.—*Cystic Disease of the Lung, L. R. Santi, Radiology, August, 1939, 33: 152.*—(*G. F. M.*)

**Atherosclerosis of Pulmonary Artery and Pulmonary Emphysema.**—These two conditions were at first thought to be interrelated, especially through the studies of Fischer and Munzer. Later this theory was apparently disproved by other observers who reported a small percentage, or a slight degree, of atherosclerosis of the pulmonary artery in patients having pulmonary emphysema. The striking difference of opinion between these observers may be explained by the fact that Fischer and Munzer probably limited their observations to the main trunk and larger branches only of the pulmonary artery, thus uncovering a high incidence of concurrence of the two pathological conditions, while later observers seem to have taken into consideration the smaller branches, too. A macromicroscopical study of the pulmonary artery in 10 cases of chronic essential pulmonary emphysema was made with complete examination of all large and small arteries and veins down to the capillaries. The special technique followed in this study is given in detail. Typically atherosclerotic lesions were noted in the main trunk and in the principal branches of the pulmonary artery; such lesions were absent in all branches with a diameter of 1 mm. or less, where, on the contrary, a very marked

dilatation and atrophy of all vessel walls were observed, with complete absence of atherosclerotic phenomena. Capillaries were often seen enormously overdistended by the blood, unusually increased in volume and deformed. The pathogenesis of these peculiar vascular conditions is to be found in the grave hydrodynamic disturbance of the lesser circulation following the enormous reduction of the capillary bed in an emphysematous lung. —*Aterosclerosi dell'arteria polmonare ed enfisema polmonare cronico ipertroppfico essenziale, R. Tosetti, Arch. di pat. e clin. med., December, 1939, 20: 272.*—(*S. L.*)

**Interstitial Emphysema.**—Interstitial emphysema of the lungs may follow injury or greatly increased intrapulmonary pressure and may be recognized clinically by the presence of air in the subcutaneous tissues about the neck. This particular type of emphysema is to be differentiated from the vesicular emphysema produced by bronchial obstruction and subsequent dilatation of the alveoli. Hamman in 1937 reported 6 such cases and since then no others have been found in the literature. Therefore it is felt the report of this particular case is of interest. The patient was a twenty-seven year old male who experienced sudden sharp pain in the left chest. Subsequently he felt substernal tightness and dyspnoea. Examination revealed a small pneumothorax on the left and air in the tissues between the anterior surface of the heart and the chest wall. After three weeks of rest he was entirely well. Interstitial emphysema must be differentiated from coronary artery disease and pericarditis. It is characterized by a sudden onset of sharp pain in the chest, accompanied by a choking sensation, dyspnoea and substernal tightness. Often a loud, crunching, grinding, crackling sound synchronous with the heart can be heard and in some cases air may be demonstrated in the mediastinal tissues. The treatment is symptomatic and the prognosis is usually favorable. —*Spontaneous Interstitial Emphysema of the Lungs; Report of an Additional Case, B. P. Wolff, Ann. Int. Med., January, 1940, 13: 1250.*—(*A. A. E.*)

**Interstitial Emphysema.**—Interstitial emphysema can be produced in cats and other animals by passing a truncated catheter into a region of the lung and blowing air into it. Thus the alveolar walls are extended with production of many small ruptures in their floors, which overlie the small branches of the pulmonary blood vessels. Correct postmortem fixation of the lungs is necessary to visualize the course of this perivascular air. The lungs are removed immediately after the experiment and filled with a fixative. The lungs are hardened in the same fixative for a day or two. In sections of such fixed tissue, the air has diffused out, but the pattern of the bubbles is well seen. Frequently, the vessels are obviously encroached upon by the pneumatic armature, and occasionally are completely collapsed. The most striking accumulations are in the roots of the lungs where the converged air streams have merged into large blebs; here the air block is of greater importance since main vessels are involved. In experimental animals the air was seen only in the sheaths of the pulmonic vessels, never in the sheaths of the bronchi or bronchial vessels. Increased pressure with further leakage of the air may produce a perforation of the mediastinum. Sometimes the air extends into the retroperitoneal tissues, down into the groin and leg, upward into the root of the neck, face, axilla, chest wall and arm, forward between the parietal pleura and pericardium, to appear as blebs overlying the heart (pneumoprecordium), and laterally into the opposite lung or unbloated parts of the same lung. Pneumomediastinum, particularly, may lead to great circulatory embarrassment and death in the animals. Rupture of the mediastinal wall sometimes produced pneumothorax. The effect of the latter is to relieve the pressure in the mediastinum and lung, thus freeing the circulation; at the same time, by collapsing the lung, it stops the leakage of air into the vascular sheaths. However, in the animals the pneumothorax was always double and complete and resulted in death. Clinical parallels for these various types of pulmonogenic pneumatization of the interstitial tissues have been described. The author believes that so little is known about the problem in

humans because of improper fixation of the lungs. Even a small leakage may be serious because of the tendency of the air to gravitate to the root of the lung where the larger vessels can be compressed. In many cases, pain in the lateral portion of the chest ushers in the outspoken signs of pneumomediastinum; the exact mechanism of this pain is not known. Infections may travel from the alveoli along these perivascular channels. Pneumoprecordium may give rise to a peculiar crunching sound first described by Hamman. Air bubbles were never observed within the pericardial cavity in animals. The pain of pneumomediastinum is often precordial and must be differentiated from coronary occlusion. It is possible that the thrust of the air even through both layers of pericardium may indent the coronary vessels and so cause anginoid pain. When the leakage is stopped, air is rapidly absorbed from the mediastinum. If the patient is in a critical condition the air may be removed surgically. Artificial pneumothorax on the side of the leak may put an end to further transport of air. The distended alveoli in the areas of compensatory emphysema surrounding areas of atelectasis in man are probably often the source of leakage of air. Thus atelectasis by engendering overstretching of the neighboring alveoli may be very harmful. Bronchopneumonia may act in the same manner and the association of interstitial emphysema with bronchopneumonia has been noted in the literature. Coughing probably facilitates the leakage. Some persons appear to be constitutionally predisposed to air leakage and suffer repeated attacks. This tendency may also be hereditary since it has been noted in more than one member of a number of families where there was no obvious disease to explain the leakage.—*Transport of Air along Sheaths of Pulmonic Blood Vessels from Alveoli to Mediastinum, C. C. Macklin, Arch. Int. Med., November, 1939, 64: 913.—(H. R. N.)*

**X-ray Damage to Lung.**—It is accepted that X-ray damage occurs much more frequently than is recognized or reported. The author reports one case in which severe X-ray damage led to death. The radiation was directed against mediastinal carcinoma, which was radiated with high doses in three courses. In the first course 7810 r was given in the region of the upper lung field through five portals. Three months later 5600 r, and after another three months 3900 r were added. Three months after the first radiation the roentgenogram showed streaky thickenings and isolated areas of confluent spot-like shadows in the left upper lung field and in the region of both hila. Shortly before death the roentgenogram showed diffuse areas of confluent spot-like shadows and abundant streaky thickenings. Autopsy (Schairer & Krombach) showed a widespread induration of the lung and a single hard large mass in the upper mediastinum, in which no tumor cells could be recognized. Two stages of lung tissue damage by X-rays, besides the latent one, can be differentiated; the principal reaction, consisting for the most part of acute inflammatory changes; and the stage of repair with intensive fibrosis. The question as to whether preëxisting lesions condition a greater susceptibility to X-ray damage has not yet been clarified. Injury to the myocardium from radiation cannot be proven. The disease is designated, according to the pathological-anatomical findings, as acute or chronic pneumonia due to radiation.—*Zur Kenntnis der Strahlenschädigung der menschlichen Lunge, R. Bauer, Strahlentherapie, 1939, 64: 249.—Rontgenstrahlenschädigung der Lunge mit tödlichem Ausgang, E. Schairer & E. Krombach, Strahlentherapie, 1939, 64: 267.—(R. K.)*

**Respiratory Tetany.**—Three types of hyperventilation, voluntary hyperpnoea, neurotic hyperpnoea and hyperpnoea due to ischaemia of the respiratory centre, are known to lead to the clinical picture of tetany. The symptomatology of hyperventilation with development of decompensated alkalosis and tetany is described in detail. It seems to be difficult to explain why tetany may be caused by hypocalcaemia without alkalosis on one hand (such as in infantile tetany, idiopathic tetany and in tetany due to hypoparathyroidism) and by alkalosis with a perfectly normal blood calcium level on the other. The theoretical answer to this problem is that both these conditions

lead to the same result, namely a hypoionization of the blood calcium. Any decrease in calcium ions increases neuromuscular excitability and therby may lead to the symptoms of tetany. It is emphasized that the amount of calcium ions in the blood depends on the amount of total calcium as well as on the reaction of the blood. Any shift to the alkaline side reduces the number of ions. The most frequent cause of spontaneous hyperventilation leading to hyperpnoea is a sexual neurosis. Occasionally hyperpnoea occurs as a sequel to *encephalitis lethargica* or as a symptom of increased intracranial pressure. The neurotic fit may be interrupted by an increase of carbon dioxide tension in the respiratory air. As this method is usually not available for the practitioner, breathing through a folded cloth is recommended with the aim of producing a slight asphyxia. Intravenous calcium injections increase the total amount of calcium and thereby may replace the calcium ions lost in the alkalotic stage.—*Die Atmungstetanie, P. H. Rossier, Schweiz. med. Wchnschr., April 22, 1939, 69: 357.*—(*A. B. T.*)

**Atelectasis.**—The history of pulmonary atelectasis and previous classifications of types are reviewed. Attention has been focussed recently on massive collapse, on which many statistics have accumulated. This condition is much less common postoperatively now than previously; routine treatment after operations is apparently responsible for the decline in incidence. Among the procedures to prevent the development of massive collapse, carbon dioxide inhalation, intravenous injection with hypertonic solutions and postural treatment have been effective. The cause of massive collapse is still obscure. There is an increasing trend to attribute it in part to an allergic, neurogenic response leading to a bronchial angioneurotic oedema. Diagnosis is not difficult when a whole lung is involved, but is hard to establish in the case of smaller lesions involving only a portion of a lung. Pulmonary infiltrations must be distinguished from it in the differential diagnosis, and an additional difficulty lies in the fact that atelectasis is often complicated by infiltration. Two cases illustrating diagnostic problems are cited.—*Atelectasia pulmonar, L. A. Passalacqua, Bol. Asoc. méd. de Puerto Rico, April, 1940, 32: 139.*—(*E. R. L.*)

**Cholesterol Granulomatosis of the Lung.**—This is the report of a study of material obtained at autopsy from a man seventy-four years old who died of acute bronchopneumonia three days after the onset of the terminal illness. He had been hospitalized in the same clinic four years previously for an acute pyelonephritis and the presence of diabetes mellitus was noted at that time. The latter condition was controlled by diet alone, and during his last year of life he was eating chiefly meat and vegetables with little bread, potatoes or fruit. The findings at autopsy were not remarkable save in the lungs. There was a moderate degree of coronary and generalized arteriosclerosis. The pancreas contained much fat and the islet tissue was for the most part gone. There was no gross lipaemia. The lungs, besides evidences of bronchopneumonia in both lower lobes, contained many crystalline foreign bodies. The latter were particularly numerous in the lower lobes especially about the vessels in the main septa and occasionally in the alveolar septa. In the middle lobe of the right lung they were situated chiefly in foci of varying sizes in the pleura. They were never seen in the vessel walls or the walls of the bronchi and alveolae. Numerous chemical tests demonstrated that these crystals were cholesterol. The crystals were all contained within one or more giant cells, and there was a complete absence of true granuloma formation with lymphocytes and epithelioid cells. There were no elastic fibres in and about the giant cells, no pigment bodies, phagocytized cells, *corpora amylacea* etc. There was no deposition of calcium. Very few of the giant cells present did not contain crystals. In the lungs as a whole there was only a very slight deposition of fat. This deposition of cholesterol is postulated to have been the result of a disturbance of esterization either locally in the lung itself or hormonal from the adrenal gland. Tissue reaction to these deposits of cholesterol seems to stop with the formation of foreign body giant cells and does not lead to fibroblast formation and vascularization as occurs in Schül-

ler-Christian's disease.—*Cholesterin-Fremdkörper-Granulomatose der Lunge bei Diabetes mellitus, J. Stahel-Stehli, Virchows Arch., September, 1939, 304: 352.*—(*C. L. D.*)

**Lungs in Drug Addicts.**—Over a period of fifteen months, roentgen examination of the chests of 674 male addicts was done, in most instances, after, and in a few, during the height of withdrawal symptoms. Most of them had acquired the habit during adolescence and had continued it consistently, except for brief intermissions. The youngest was seventeen years old and the oldest sixty-two; the average age was thirty-nine. At the time of observation the duration of addiction ranged from three months to thirty-nine years. The average was eighteen years. Almost all the patients had taken more than one drug at some time. Heroin, opium, morphine and cocaine were used in order of frequency. In addition, a few had used hashish, *cannabis* and *laudanum*. Most of the drugs were taken subcutaneously. Other routes were intravenous injection, smoking and inhalation. The entire withdrawal treatment lasted six days and consisted of subcutaneous injections of progressively diminished quantities of morphine sulphate. Of the 674 patients the thoracic roentgenograms of 86.5 per cent showed various abnormalities. The commonest abnormality consisted of pulmonary changes characteristic of hypertrophic emphysema, i.e., voluminous lung fields, prominent hilar shadows, diffuse, increased vascular markings, obliteration of one or both costophrenic sinuses and tenting of one or both diaphragmatic domes. The group in which these changes were present numbered 207 patients (30.7 per cent), most of whom had used drugs from fifteen to twenty years. Another group of 94 patients (13.9 per cent) showed signs of emphysema without signs of increased pulmonary markings. Thirty-two patients (4.7 per cent) showed increased markings with slight or no signs of emphysema; the addicts in this group had, according to their history, a short period of addiction, from three months to five years. The remaining 149 addicts (39.1 per cent) showed, in addition, the following changes: fibroindurative tuberculosis of one or both apices and occasionally of the subapical regions, minimal apical scarring, fibrocaseous pneumonic tuberculosis, calcified tuberculosis of one or both upper lobes, bronchiectasis, calcareous pleuritis, interlobar effusion (1 case), and bullous emphysema (1 case). In the few cases where roentgen examination was done during the height of the withdrawal symptoms, there was marked accentuation of the thoracic findings; subsequent roentgenograms invariably showed some regression after the symptoms subsided. The cardiac shadow was invariably small except where some cardiac complication, such as hypertension, was present. Since many of the structural pulmonary changes observed in these patients are commonly observed in long standing infections of the upper respiratory tract, 100 ambulatory addicts were studied to determine the status of the upper respiratory tract. Possible foci of infection were found in 37 per cent. When this is compared with the total number of patients with abnormal thoracic findings, 86.5 per cent, the author feels that the existent foci of infection could not possibly have produced the described pulmonary changes in so large a number of persons. Eighty addicts confined to the hospital for acute illnesses were studied to determine whether the above described pulmonary changes could be attributed to the coexistence of other diseases. The most common illnesses for which these people were hospitalized were acute bronchitis, malaria, syphilis, tuberculosis, malnutrition, bronchial asthma, arteriosclerotic heart disease, duodenal ulcer and psychoses. Ten of this group had active pulmonary tuberculosis. The marked increase in pulmonary X-ray findings during the height of withdrawal symptoms may be due to a lowered body resistance and possibly to an exacerbation of a chronic upper respiratory infection. In addition, an important explanation may be deduced from experimental work in animals which has demonstrated, among other things, increased volume of liver and lung which altered capillary permeability after injection of morphine sulphate in cats. These experimental findings may also explain the frequent obliteration of the costophrenic sinuses and thickening of the right interlobar fissures observed in drug addicts; these changes may represent organiza-

tion of fluid in the free pleural space and interlobar fissures which is probably the result of transudation due to altered capillary permeability.—*Structural Changes in the Lungs of Drug Addicts, G. C. Cole, Arch. Int. Med., November, 1939, 64: 1039.*—(*H. R. N.*)

**Penetrating Wounds of Thorax.**—Of 171 gunshot and stab wounds seen during a ten-year period at the Akron City Hospital, 87 were penetrating wounds. Of these, 50 were caused by gunshot and 37 by stabbing. The most common symptoms were dyspnoea, chest râles, coughing and haemoptysis. Less frequently there was cyanosis, emphysema, hiccough and painful respiration. There was evidence of shock in half the cases. The most common complications were haemothorax, pneumothorax and pneumohaemothorax. Empyema developed in 3 cases, pleuritis in 12, pericarditis in 3 and pneumonia in 10 cases. Partial collapse of the lung occurred in 10 cases and pneumonia in 10 cases. A conservative attitude has been followed in treatment. Surgical treatment depends on the nature of the wound and the complications present in the individual case. By waiting before evacuation of a haemothorax one gives the lung a chance to heal before opening the chest and precludes the introduction of infection. Of 49 cases of haemothorax, pneumohaemothorax or pneumothorax, thoracentesis was carried out in 15. Infection within the chest occurred in only 4 cases. Death occurred in 7 of the 37 patients with stab wounds and in 18 of the 50 with gunshot wounds.—*Penetrating Gunshot and Stab Wounds of the Thorax, C. R. Steinke, J. Thoracic Surg., August, 1939, 8: 658.*—(*L. F. B.*)

**Brucellosis and Tuberculosis.**—Brucellosis is widely prevalent in Europe and America. The disease is probably contracted by contact as well as ingestion. It causes clinical symptoms and occasionally pathological-anatomical lesions similar to those in tuberculosis. The two diseases may coexist. Because of the clinical polymorphism of the two diseases, it is frequently necessary, in order to establish the diagnosis, to have evidence from radiography, sputum examination and tuberculin reaction on the one hand, and blood culture, agglutination, opsonic index and brucellin reaction on the other.—*Estudio sobre la difusión de la brucelosis y su semejanza clinica con ciertas formas de tuberculosis, R. Garcia Cerviño, Rev. Mexicana de Tuberc., April, 1940, 2: 103.*—(*E. R. L.*)

**Oil Pneumonia.**—Oil aspiration pneumonia occurs more frequently among adults than is commonly recognized. Forty-seven cases are reported, 41 of which were autopsied. The ages ranged from twenty to eighty-two years. Many of these patients were elderly individuals suffering from debilitating diseases. Neurological patients, in whom dysphagia is a frequent manifestation, formed a large part of the younger age group. Liquid petrolatum was by far the most common aetiological agent. The oil was frequently taken orally in large amounts for years as an intestinal lubricant. In addition, it was used intranasally or intratracheally, the latter usually as a lubricant in cases of tracheotomy. The fats and oils of animal origin, which are important in the production of lipoid pneumonia in children, play a small rôle in adults. Vegetable oils, such as iodized poppyseed oil, are chemically nonirritating; these oils can be eliminated from the lungs even in the presence of lesions due to liquid petrolatum, as illustrated in 2 cases in this series. Oil introduced into the pharynx is capable of entering the bronchial tree without exciting reflex inhibition. In addition, the oil hinders ciliary activity by mechanically slowing up or stopping the stream of mucus normally set up by the beat of the cilia. In adults who take oil orally, pathological processes which interfere with normal cough, palatal or swallowing reflexes become important predisposing factors. The condition is therefore frequently encountered in debilitated, recumbent and aged persons, in persons with dysphagia of nervous origin and in patients in whom neoplastic or other destructive processes involve the mouth and throat. Once aspirated, the disposition of the oil appears to depend mainly on gravity and inspiratory suction. In this series, the right lower lobe was involved in 34 instances, the left lower lobe in 29 instances, the right middle lobe in 25 cases, the

right upper lobe in 16 and the left upper lobe in 13. The lower portions of the individual lobes were most often affected. In only 2 instances were the upper lobes alone involved. At the onset, the lung responds to the presence of liquid petrolatum with a prompt macrophage reaction. These cells take up the oil and appear as foam cells. Extracellular oil is usually present. The liquid petrolatum can be identified by staining and chemical extraction methods. Grossly, the involved portions of lung are gray-yellow unless inflammatory changes are present. This first reaction is followed and gradually replaced by fibrous proliferation of the interstitial tissue which appears to be in large part a foreign body reaction. Oil remains entrapped within this fibrous tissue. Ultimately there remains a mass of hyalinized fibrous tissue with the entrapped oil, a true paraffinoma. Part of the oil may be carried to the regional lymph nodes. The lesions are frequently seen in the same lobe in all the different stages of development. There are no specific signs or symptoms characteristic of this disease. The disease may be entirely symptomatic. Frequently, the condition is entirely unsuspected and is recognized only at autopsy. Symptoms were present in about half the cases. These consisted of mild, moderately productive cough, occasional chest pain, intermittent fever up to 101°F. lasting for several weeks to months. In 6 cases the clinical course was characterized by repeated bouts of bronchopneumonia. The physical findings are those associated with any chronic pneumonitis. In 16 cases there were no abnormalities on physical examination. No clubbing of the fingers was observed in this series. The leucocyte count and erythrocyte sedimentation rate are not affected by the oil pneumonia *per se*, although they are affected by secondary inflammatory changes. The presence in the sputum of either intracellular or extracellular oil globules is a diagnostic aid, provided liquid petrolatum can be chemically identified and provided the patient has had no oily medication for several days before the examination. The roentgenographic findings are important. In the early stages the markings in the lower lung fields are exaggerated. As the lesions progress, linear and nodular infiltrations develop until finally areas of consolidation are formed. These are almost always situated at one or both pulmonary bases. They usually lie close to the cardiac shadow and extend from the hilum to the diaphragm. Serial X-ray may show no changes for years other than gradual shrinkage of these areas due to progressive fibrosis. Enlargement of hilar shadows is not as prominent in adults as it seems to be in children. When bronchopneumonia supervenes, the X-ray film presents a confusing picture of the basal oil lesions with superimposed exudative reaction. As the bronchopneumonia subsides, the basal lesions become more distinct. The roentgen picture of oil pneumonia must be differentiated from other chronic lesions such as bronchiectasis, unresolved pneumonia, pulmonary metastasis, primary lung tumor, infarct and tuberculosis. Definite differentiation by X-ray is not always possible, and often only serial pictures and the clinical course will aid in the diagnosis. Unless the pulmonary lesion produced by the oil is so extensive that the patient dies of asphyxia, as occurred in one case, it cannot of itself be considered a direct cause of death. The patient may live for an indefinite period until carried off by his primary disease or secondary infection. Diagnosis is primarily based upon the X-ray picture and on the history of oil intake, often combined with some known predisposing factor. Administration of oil even in the presence of predisposing factors does not mean that oil pneumonia will necessarily occur. Liquid petrolatum is widely used and the relative incidence of oil pneumonia is apparently small. However, its potential danger when used promiscuously in debilitated and dysphagic patients should be recognized.—*Oil Aspiration (Lipoid) Pneumonia in Adults, D. Freiman, H. Engelberg & W. Merrit, Arch. Int. Med., July, 1940, 66: 11.*—(*H. R. N.*)

**Effects of Industrial Gases upon Lung.**—It is apparently the accepted belief that men who are exposed to irritating fumes in industry develop specific conditions of the lungs as the result of this exposure. A review of the literature fails to disclose that studies, including serial X-ray films, have been made on an employee group so exposed. Therefore, for the

past five years serial chest X-ray films of a large number of men employed in the chemical industry were made to determine the effects upon the lung of exposure to low concentration of hydrochloric acid, chlorine, hydrofluoric acid, sulphur dioxide, sulphur trioxide, phosgene, phosphorus oxychloride and phosphorus trichloride gases. Upon admission to these occupations the men have been found to have various changes in the lung tissue as evidenced by fibrosis and in some cases by calcification and fibrosis indicating healed tuberculosis. In all cases the X-ray films show no visible evidence of lung changes indicating that the gases discussed have not materially affected the lung tissue. In addition to the X-ray studies, each man received a clinical examination every three months. At the same time non-company illnesses were followed through an insurance plan. The incidence of pulmonary infection in the group studied was found to be no greater than occurred in other plant employees and the death rate from pneumonia and other pulmonary infection was the same as for other plant employees. It is felt that the study has not been continued long enough to reach emphatic conclusions, but there is reasonable assurance that under the present methods of operation the men studied have not experienced any serious effects as the result of the exposures to which they have been subjected.—*An X-ray Study of the Effects of Industrial Gases upon the Human Lung, E. E. Evans, Radiology, April, 1940, 34: 411.*—(*G. F. M.*)

**Idiopathic Pneumothorax.**—In the older literature spontaneous pneumothorax was regarded a due to rupture of a tuberculous process or some other destructive process of the lung into the pleural cavity. Later it was noted that often there was no demonstrable disease and the condition was regarded as idiopathic. The theory was then advanced that in such cases an emphysematous bleb or a bleb located near a pulmonary scar ruptured, and in some cases a bleb at the surface of the lung could be demonstrated. Castex and Mazzei reported twelve cases in which rupture of the bullae appeared to be the cause. In 1938 Kirshner called attention to the fact that spontaneous pneumothorax may occur in young people who rarely show emphysema and advanced evidence in support of the theory that idiopathic pneumothorax may be due to "a congenital pleural defect or an acquired pulmonary defect with a congenital anlage." Nine cases are described by the author which invite speculation in support of Kirshner's theory and suggest that in spontaneous pneumothorax we are dealing with a primary constitutional inferiority of the pleural structure. All of these patients were males under forty-six years with an average age of twenty-nine. The condition was precipitated by some petty cause or no apparent cause. Complete collapse was the rule with no demonstrable adhesions and fluid usually was absent, though one would expect that the mechanical insult of perforation and sudden collapse would elicit such a response even in the absence of disease. A recurrence of the incident is not infrequent and occurred in one patient in this series; many such cases are reported in the literature, for apparently the lung does not tend to become adherent. The author regards the familial occurrence reported by others as a major argument in favor of this being a constitutional disease, although he has no familial cases in his own series. In the absence of disease one would anticipate that the lung would reëxpand in four to eight weeks. The average time for reëxpansion was a little over two months in this series. One patient died with haemopneumothorax.—*The Etiology of Idiopathic Pneumothorax, H. J. Lorge, Am. J. M. Sc., May, 1940, 199: 635.*—(*G. F. M.*)

**Spontaneous Pneumothorax.**—Spontaneous pneumothorax is characterized by sudden occurrence in apparently healthy persons without accompanying pleural exudate, fever or other constitutional symptoms, and with eventual complete recovery. It usually occurs in early adult life, more frequently in men than in women. Prolonged observation makes it apparent that patients who have had spontaneous pneumothorax do not necessarily later show evidence of tuberculosis, or at least only occasionally. Three causes for spontaneous pneumothorax have previously been recognized: (1) the rupture of subpleural valvular vesicles; (2) disruption of the visceral pleura

by the tension of visceral-parietal adhesions; (3) the rupture on the pleural surface of congenital pulmonary cysts. In addition to these causes a fourth probable cause is the rupture of the mediastinal pleura subsequent to mediastinal emphysema. Interstitial emphysema of the lung may occur without untoward physical effort. When air reaches the mediastinum and distends the mediastinal tissues the patient usually complains of substernal pain which may radiate to the back or neck. There are no constitutional symptoms. Physical examination usually discloses diminution or complete absence of the area of cardiac dulness and in many instances a peculiar and distinctive sound heard over the cardiac area during systole. Roentgenograms usually aid in establishing the diagnosis by disclosing the presence of mediastinal air, and when air is either palpable in the neck or seen there in roentgenograms, the diagnosis is at once certain. Spontaneous pneumothorax occurred in 2 of the 7 cases of spontaneous mediastinal emphysema observed. This may occur in one of two ways. Either the air may travel along the interstitial bands of connective tissue to the pleural surface and there produce a vesicle which subsequently ruptures or the air may perforate the thin mediastinal wall into the pleural cavity. Experimental and clinical evidence support the view that in such instances spontaneous pneumothorax occurs because of the rupture of the mediastinal wall in the presence of mediastinal emphysema. It is suggested, therefore, that all patients who develop spontaneous pneumothorax should be carefully examined for the presence of mediastinal emphysema.—*A Note on the Mechanism of Spontaneous Pneumothorax, L. Hamman, Ann. Int. Med., December, 1939, 13: 923.*—(*A. A. E.*)

**Pulmonary Oedema.**—The classical explanation of the mechanism of pulmonary oedema has been based upon congestion in the lesser circulation due to failure of the left ventricle. Recent researches have, however, stressed the importance of central nervous system influence in the pathogenesis of pulmonary oedema. It is possible, in every case, to produce fatal pulmonary oedema in dogs by suboccipital injection of 40 to 50 gamma of veratrine. Similar effects can be elicited in guinea pigs and rats. The effect is not specific for veratrine, since it can be produced by the suboccipital injection of other drugs such as aconite and strophanthin. If the animal is anaesthetized by chloral hydrate or urethane, the pulmonary oedema can be diminished or prevented. The oedema occurs within four minutes after injection and the animal dies rapidly. On postmortem examination the lungs are cyanotic and tense. Histologically, all the vessels are filled with blood. Many capillaries are dilated and packed with blood cells. Most of the alveoli are dilated; some contain exudate and the remainder air. In many areas blood is seen lying free in the interstitial tissues. The changes are focal in character. In the guinea pig and rat the oedema is mainly present at the periphery of the lung. The heart shows no dilatation. In order to study the mechanism of the reaction the authors studied several dogs who had been subjected to a suboccipital injection of veratrine. The basis of the reaction appears to be a marked stimulation of the sympathetic system. There is severe peripheral vasoconstriction. In this manner blood is forced from the greater into the lesser circulation. This overfilling of the lesser circulation together with the loss of tonus of the smaller pulmonary vessels, effected by the stimulation of the pulmonary sympathetic, accounts for the massive oedema in these animals.—*Zentrogenes Lungödem, A. Jarisch, H. Richter & H. Thoma, Klin. Wchnschr., November 11, 1939, 18: 1440.*—(*H. R. N.*)

**Pneumococcic Empyema.**—The authors report a case of pneumococcic empyema and nodular tuberculosis complicating a Jacobaeus operation and treated by sulfapyridine orally and intrapleurally. Later, a tuberculous bacillaemia occurred as verified by four positive inoculations of the patients blood in guinea pigs. In lavaging the infected pleural space serum containing a small amount of Lugol's solution was used, later followed by an injection of 2 cc. of a 33 per cent solution of sodium Dagenan diluted in physiological serum. After six days of this treatment the pleural fluid was found

bacteriologically sterile but the patient succumbed to the bacillaemia. The pneumococcic seeding of the pleura probably resulted from a pulmonary perforation although this was not demonstrated clinically either by manometric pressure readings or by dye.—*Section de brides. Pleurésie purulente pneumococcique traitée par les sulfamide. Granulie pulmonaire avec bacillémie, D. Douady, J. Braillon & G. Georges, Arch. méd. chir. de l'app. respir., 1939, 14: no. 1, 46.*—(*J. E. F.*)

**Congenital Absence of Hemidiaphragm.**—A case is reported of such an abnormality in an eight year old boy, who for the last two years had complained of frequent belching and of occasional emesis following the evening meal; this latter symptom was allayed if the supine position was taken soon after the meal. A diagnosis of left pleural effusion had been made seven years previous, because of a low-grade fever and dry cough. Physical examination was negative except for a few findings in the left hemithorax: lack of expansion, tympany over the upper half and flatness over the lower half, and generally feebler breath sounds especially at the base. The spleen could not be palpated. The heart was markedly shifted to the right and the apex beat was heard back of the sternum. Radiograms, taken before and after a barium meal, showed large intestinal loops occupying most of the left hemithorax. Following the report of physical findings, there is a brief discussion of embryological and foetal development of the diaphragm. After a review of the literature and of differential diagnoses, the author concludes that the most probable hypothesis in the case presented is that of a congenital absence of the left hemidiaphragm.—*Assenza congenita dell'emidiaframma sinistro, V. Fanano, Riv. di pat. e clin. d. tuberc., August, 1939, 13: 576.*—(*S. L.*)

**Histaminase in Hay Fever.**—Histaminase has become a popular drug for clinical experimentation in allergic diseases and allied disorders. This is based entirely on the assumption that the allergic reaction is caused by the liberation of "H-substance" at the site of contact of antibody with antigen and on the probability that histaminase might inactivate the "H-substance", which is similar but not identical to histamine. Fifteen patients known to have typical symptoms of hay fever beginning about the middle of August and lasting until the first frost were chosen for study. Each patient gave a typical reaction to a weak dilution of ragweed extract. On August twenty-third the high pollen. concentration produced typical symptoms of hay fever in all 15 patients. The patients were instructed to take 45 units of histaminase daily, but later the dose for 6 of the patients was increased to 60 and 75 units a day. Improvement in all cases after two days coincided with a drop in pollen counts, but symptoms reappeared and became worse with rising pollen counts. All patients continued to have hay fever during the course of study. Titrated intracutaneous tests with histamine acid phosphate were made before and after histaminase therapy. This therapy did not alter the histamine reaction of any of the fifteen patients. The author concludes that histaminase is of no practical usefulness in the treatment of hay fever.—*Histaminase in the Treatment of Hay Fever, E. L. Keeney, J. A. M. A., June 22, 1940, 114: 2448.*—(*G. L. L.*)

**Potassium in Hay Fever.**—In a study of the effect of prolonged administration of potassium salts, 153 patients with hay fever or hay fever with asthma received potassium chloride or potassium gluconate for periods varying from several days to a few weeks. The usual dose for adults was 10 to 15 grains of potassium chloride or from 15 to 30 grains of potassium gluconate three or four times daily. The dose for children was from 5 to 10 grains of potassium chloride three to four times daily. Of the 153 patients only 7 patients experienced mild relief, while 146 patients obtained no relief. Two patients became worse. On a group comparative basis, of 30 patients with hay fever symptoms who had inadequate or no specific desensitization therapy, 2 had mild relief and one was made worse; of 52 patients with hay fever and asthma who had inadequate or no specific desensitization therapy, only 2 obtained mild relief; of 24 with hay fever who had adequate specific therapy, but had remaining

symptoms, none were improved; of 44 patients with hay fever and asthma who had adequate desensitization but remaining symptoms, mild improvement was noted in 3 cases. The authors conclude that potassium salts have no practical usefulness in the treatment of hay fever.—*Potassium Salts in the Treatment of Pollinosis: A Clinical Evaluation, S. S. Rubin, A. L. Aaronson, M. A. Kaplan & S. M. Feinberg, J. A. M. A., June 15, 1940, 114: 2359.*—(*G. L. L.*)

**Potassium in Hay Fever.**—The authors have repeated the work of Bloom, in attempting to determine the value of potassium salts orally in the treatment of hay fever. Forty patients were treated in two groups, 9 patients in January, when there was no pollen in the air, and 31 patients in the period from June to November. Control solutions were prepared and used alternately with the solution of potassium salts. None of the first group of 9 obtained any relief. A stronger solution of potassium chloride was used with two control solutions for 31 patients in the second group. Only 2 of the group reported relief, but the control solutions also provided relief in these 2 patients. Several of the patients had no relief for urticaria and migraine, and several with bronchial asthma had no aggravation of symptoms on taking the salt. None of the patients treated with potassium had previously shown any relief from specific treatment based on cutaneous testing. The authors were therefore unable to substantiate the good results reported by Bloom in the treatment of 29 cases, in which potassium afforded degrees of relief varying from 50 to 100 per cent in all cases.—*Potassium Salts in Hay Fever, H. Miller & G. Piness, J. A. M. A., April 27, 1940, 114: 1627.*—(*G. L. L.*)

**Hodgkin's Disease.**—The author analyzes 212 proved cases of Hodgkin's disease, showing a preponderance in males between the ages of twenty and forty. Its occurrence is unusual in girls under fifteen. There were no apparent predisposing factors. In 79 per cent of the series lymph node enlargement was the first abnormality noticed. Unilateral lymphadenopathy was more usual in early cases. Discharging sinuses occurred in 7 cases, possibly indicative of a concomitant tuberculosis. There was infrequency of splenomegaly in early cases. There was no uniform pathognomonic roentgenographic mediastinal picture. In no instance was there enlargement of the mediastinal nodes without palpable cervical, supraclavicular or axillary adenopathy. In 19 instances the parenchyma of the lung was dotted with nodules, varying in size from a ten cent piece to a half dollar. Fourteen individuals (6.6 per cent) showed roentgenographic evidence of disturbances of the osseous system. There were 10 instances of diplegia. The transverse myelitis may be explained by an epidural invasion with a resulting choking off of the blood supply to the spinal cord. The most constant blood picture was a diminution in the lymphocytes with an increase in monocytes. A continuous low grade type of pyrexia was present in most cases. The Pel-Ebstein variety was uncommon. The average duration of life after onset of symptoms of the 123 patients who died under observation was 32.06 months. The average duration of life after the institution of therapy was 23.8 months.—*An Analysis of 212 Cases, L. B. Goldman, J. A. M. A., April 27, 1940, 114: 1611.*—(*G. L. L.*)

**Erythema Nodosum in Coccidioidomycosis.**—A study was made of 453 patients with erythema nodosum or multiforme in Kern and Tulare counties in the San Joaquin Valley in California. A tuberculous aetiology was established or considered probable in 11 patients. Coccidioidomycosis (San Joaquin fever) was considered the cause in 432 patients. In practically every instance diagnosis was confirmed by a positive coccidioidin test. Cover slip examination, culture and guinea pig inoculation of the sputum were made in patients who had expectoration. *Coccidioides immitis* was demonstrated in 72 per cent of patients with satisfactory specimens. Physicians rarely failed to diagnose erythema nodosum, but erythema multiforme twice resulted in a diagnosis of eczema, and six times in a diagnosis of smallpox. On the other hand, patients were diagnosed as having San Joaquin fever when they were suffering with acute

appendicitis, lead colic, smallpox, secondary syphilis and tuberculosis. It was possible to determine the incubation period of the disease in several patients who acquired the infection on a brief visit to the valley. The incubation periods ranged between one and three weeks, most frequently falling around two weeks. In several instances the relationship of the erythema nodosum to development of allergy was shown by a change of reaction to coccidioidin from negative to positive at the time of appearance of the erythema. That sensitivity to coccidioidin can persist for a long time without exogenous reinfection was shown by a test made on a physician who had become infected in a laboratory in 1929. Although there had been no possible exposure to the fungus after 1932, a test made in 1938 showed a severe reaction with necrosis. Only two possible instances of recurrence of San Joaquin fever were encountered, indicating that postprimary erythema nodosum is as infrequent in coccidioidomycosis as in tuberculosis. Evidence that coccidioides spherules did not pass from man to man was shown by study of bed-mates. The endosporulative spherules which occur within the animal host and in the sputum are apparently rarely, if ever, infectious. Infection occurs through inhalation of the chlamydospores characteristic of the fungus in nature and readily adapted to widespread dissemination. The seasonal distribution of the erythema attacks bears this out. The highest incidence occurred during the summer and autumn when agricultural activity is at its peak. Few cases occurred during the rainy seasons. A predilection for females was noted comparable to that of tuberculous erythema nodosum. Coccidioidomycosis appeared most commonly among presumably nonimmune young persons and recent residents. Nearly half the patients had lived in the valley less than a year. Gifford's studies with the coccidioidin test are cited. The percentage of reactors ranged from 17 per cent in school children resident in the valley less than one year to 77 per cent in children resident ten years or more. In the series of 432 patients with erythema, none developed coccidioidal granuloma; this severe and often fatal form of the disease is, however, less infrequent among Negroes and Filipinos.—*Epidemiology of Acute Coccidioidomycosis with Erythema Nodosum ("San Joaquin" or "Valley Fever")*, *C. E. Smith, Am. J. Pub. Health, June, 1940, 30: 600.*—*(H. L. I.)*

**Erythema Nodosum in Coccidioides.**—Seven cases of *erythema nodosum*, definitely proven to be associated with the *Oidium coccidioides* in children ranging from the ages of three and one-half to thirteen years, have been presented as being independent of either tuberculous or rheumatic infection. Only those specimens in which the fungus could be cultured on Sabouraud's medium, recovered from guinea pigs after inoculation and then recultured, have been classed as positive. In all instances a definite pulmonary complication accompanied the *erythema nodosum*, as shown by clinical and X-ray findings, but which resolved entirely within a month's time and failed to progress later into granulomatous or caseous lesions. No tubercle bacilli were ever isolated from any of the specimens, and, in all but one case, the Mantoux tests were negative.—*Erythema Nodosum in Childhood Associated with Infection by the Oidium Coccidioides, Juliet Thorner, Arch. Pediat., October, 1939, 56: 628.(From Author's Summary)*—*(M. B.)*

**Thrombosis of Superior Vena Cava.**—This is a rare pathological condition although easily recognized, there having been collected from the literature only 309 cases of obstruction reported up to 1933, by Ehrlich, Ballou and Graham. Aortic aneurysms and malignant mediastinal tumors were found to account for a large percentage of total obstructions. If the cases due to thrombosis are separated the number is reduced to 120 reported in the literature up to 1936, not all these being proved, of which 29 per cent were due to external pressure, 23 per cent associated with mediastinitis and 36 per cent with phlebitis. There is an interesting group of cases with unknown aetiology. A case is reported in a policeman of thirty-eight who complained of a bursting sensation in the ears, aggravated by bending down, who had had lobar pneumonia three years before and a small localized thrombosis of the right leg in 1936. His symptoms had begun

a month before hospital admission (to St. Thomas' Hospital, London) and two weeks later there had been a small haemoptysis and some dyspnoea on exertion. Sputum had failed to show tubercle bacilli on concentration and chest X-rays had revealed merely a slight evidence of the mediastinal shadow, lung fields being normal with no evidence of tumor. Right artificial pneumothorax was induced with a view to thoracoscopy but the apical and mediastinal surfaces were adherent. Exploratory thoracotomy showed the superior vena cava as a hard band running from the root of the neck into the right auricle and no constricting bands or tumor were found. Signs of obstruction were somewhat less evident four months later. It was thought that the lobar pneumonia might have been a factor by setting up a mediastinitis. The ultimate prognosis is generally regarded as unfavorable, improved circulation being possible only by canalization of the clot, but in this case the immediate prognosis seemed good. Treatment of the condition is discussed, especially radical removal of tumors and constricting bands, and palliative treatment of some cases by mediastinal decompression which is justifiable where pressure increases sufficiently to cause collapse of softer structures. Exploratory thoracotomy is advised in cases of doubtful aetiology.—*Thrombosis of the Superior Vena Cava, E. M. Buzzard, Tubercle, January, 1940, 34: 39.*—(*A. P.*)

**Key to Abstractors**

*A. A. E.:* Adrian A. Ehler, Albany, New York.
*A. B. T.:* Alice B. Tobler, Baltimore, Maryland.
*A. P.:* Andrew Peters, Springfield, Massachusetts.
*C. L. D.:* Charles L. Dunham, Chicago, Illinois.
*E. C. I.:* Enrique Coronado Iturbidi, Philadelphia, Pennsylvania.
*E. R. L.:* Esmond R. Long, Philadelphia, Pennsylvania.
*F. G. P.:* Frank G. Petrik, Oneonta, New York.
*G. C. L.:* G. C. Leiner, New York City.
*G. F. M.:* Gertrude F. Mitchell, Detroit, Michigan.
*G. L. L.:* George L. Leslie, Howell, Michigan.
*H. L. I.:* Harold L. Israel, Philadelphia, Pennsylvania.
*H. R. G.:* Horace R. Getz, Philadelphia, Pennsylvania.
*H. R. N.:* H. R. Nayer, New York City.
*J. E. F.:* Jason E. Farber, Buffalo, New York.
*J. S. W.:* J. Stanley Woolley, Liberty, New York.
*L. F. B.:* Lauren F. Busby, Northville, Michigan.
*M. B.:* Miriam Brailey, Baltimore, Maryland.
*R. K.:* Robert Klopstock, Boston, Massachusetts.
*S. L.:* Salvatore Lojacono, Howell, Michigan.